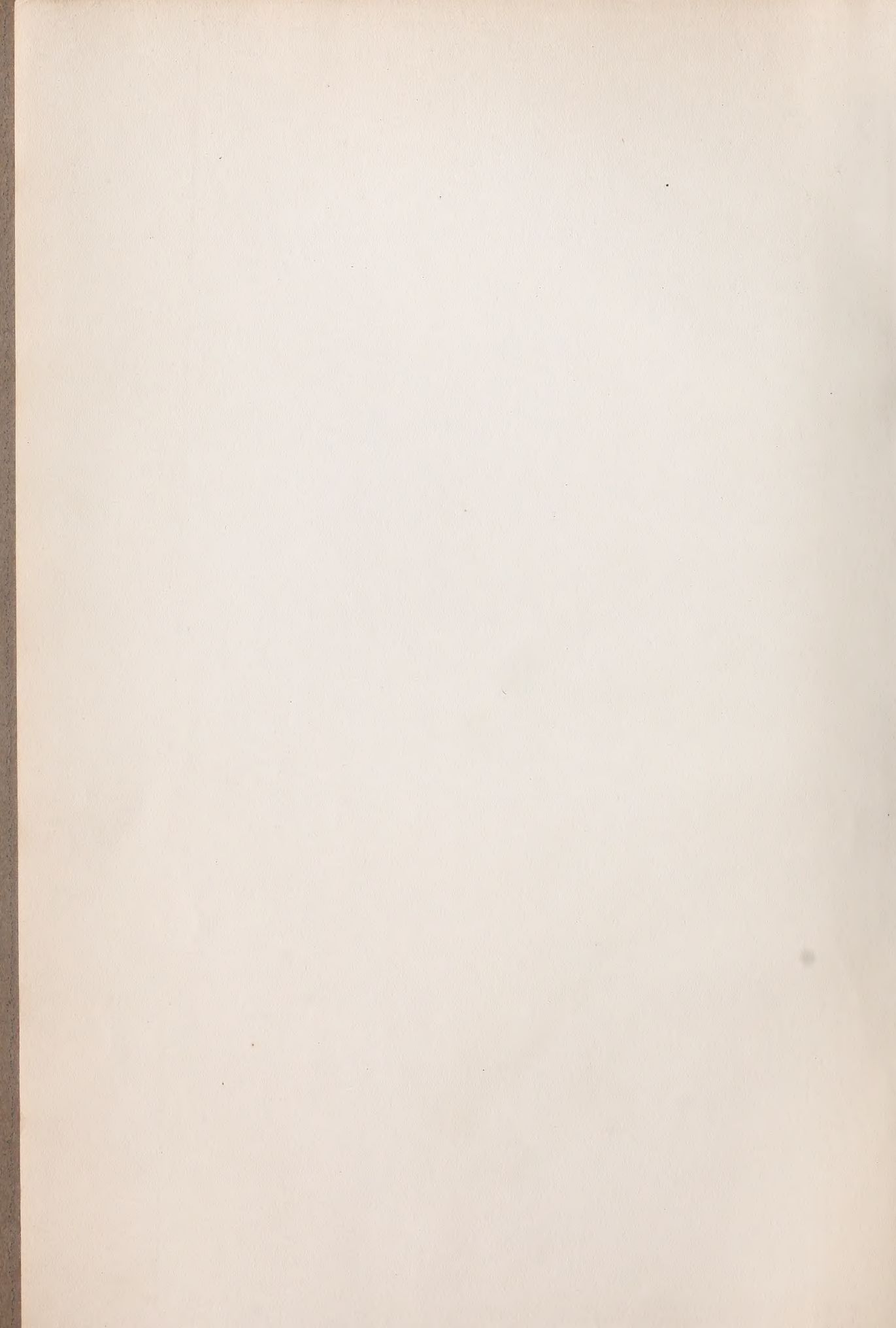


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VOL. XVII.

GRAPHOPHONE PATENTS.

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189,888 - No. 1,310,840.

July - December, 1916.

1,189,222, July 4, Aitair, Phonograph Stop;
1,189,418, July 4, Aitair, Phonograph Stop;
1,189,592, July 4, Lutz, Illuminating Device;
1,190,005, July 4, Ralph, Filing Device for Disk
Records;
1,190,042, July 4, Aiken, Process and Apparatus for
Soldering;
1,190,112, July 4, Clewson, Arrestor for Sound Pro-
ducing Apparatus;
1,190,133, July 4, Eichen, Means for Recording Sound;
1,190,242, July 4, Delany, Sound Reproducing Apparatus;
1,190,510, July 11, Barnes, Process of Forming Articles
from Plastic Material;
1,190,533, July 11, Delany, Talking Machine;
1,190,536, July 11, Delany, Talking Machine Recorder

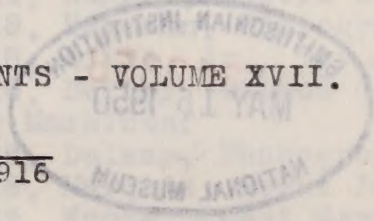
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PATENTS.

U. S. Patents
GRAPHOPHONE PATENTS - VOLUME XVII.

1916



NUMERICAL LIST

OF

PATENTS.



(NUMERICAL LIST)

VOL. XVII.

GRAPHOPHONE PATENTS.

No. 1,189,222 - to - No. 1,210,248.

July - December, 1916.

-
- 1,189,222, July 4, Adair, Phonograph Stop;
1,189,418, July 4, Adair, Phonograph Stop;
1,189,592, July 4, Lutz, Illuminating Device;
1,190,005, July 4, Ralph, Filing Device for Disk
Records;
1,190,072, July 4, Aiken, Process and Apparatus for
Molding;
1,190,112, July 4, Clawson, Arrestor for Sound Pro-
ducing Apparatus;
1,190,133, July 4, Edison, Means for Recording Sounds;
1,190,249, July 4, Delany, Sound Reproducing Machine;
1,190,510, July 11, Burns, Process of Forming Articles
from Plastic Material;
1,190,635, July 11, Delany, Talking Machine;
1,190,636, July 11, Delany, Talking Machine Recorder
and Reproducer;
1,190,673, July 11, Repp, Phonograph;
1,190,728, July 11, Clair, Tone Arm for Talking Mach-
ines and the Like;
1,190,748, July 11, Freeman, Phonograph Record Cabinet;
1,190,787, July 11, Miller, Voice and Sound Recording
Machine;
1,190,808, July 11, Stoiber, Operating Mechanism for
Phonographs;
1,191,003, July 11, Hughes, Record Holder;
1,191,182, July 18, Heymann, Dictograph Apparatus;
1,191,202, July 18, Little, Jr., Toy Phonograph;
1,191,674, July 18, Delany, Method of Construction of
Talking Machines;
1,191,675, July 18, Delany, Phonograph or Talking Machine;
1,191,808, July 18, Marquis, Sound Regulator;
1,192,026, July 25, Woods, Speed Governor;
1,192,289, July 25, English, Sound Box;
1,192,337, July 25, Myers, Sound Box for Phonographs;
1,192,402, July 25, Emerson, Musical Instrument;
1,192,567, July 25, Sanders, Method of Manufacturing
Sound Record Tablets;
1,192,828, July 25, Crawford, Device for Reproducing
Sound;
1,192,833, July 25, Steurer, Sound Box;
1,192,834, July 25, Steurer, Sound Reproducing Box;
1,192,836, July 25, Jones, Sound Box for Talking Mach-
ines;

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CHARACTERISTICS PATENTS

No. 1,189,323 - to - No. 1,210,240.

July - December, 1916.

1,189,323	July 4	Adair, Phonograph Stop;
1,189,418	July 4	Adair, Phonograph Stop;
1,189,532	July 4	Adair, Illuminating Device;
1,190,002	July 4	Kalish, Piling Device for Disk
		Records;
1,190,073	July 4	Allen, Process and Apparatus for
		Welding;
1,190,112	July 4	Claeson, Arranger for Sound Pro-
		ducing Apparatus;
1,190,133	July 4	Edison, Means for Recording Sounds;
1,190,242	July 4	Edison, Sound Reproducing Machine;
1,190,210	July 11	Burns, Process of Forming Articles
		from Plastic Material;
1,190,222	July 11	Edison, Talking Machine;
1,190,232	July 11	Edison, Talking Machine Recorder
		and Reproducer;
1,190,273	July 11	Kegg, Phonograph;
1,190,728	July 11	Clark, Tone Arm for Talking Mach-
		ines and the Like;
1,190,748	July 11	Freeman, Phonograph Record Cabinet;
1,190,787	July 11	Miller, Voice and Sound Recording
		Machines;
1,190,802	July 11	Storck, Operating Mechanism for
		Phonographs;
1,191,003	July 11	Haggen, Record Holder;
1,191,122	July 18	Kayman, Stenograph Apparatus;
1,191,202	July 18	Miller, Stenograph;
1,191,274	July 18	Edison, Method of Construction of
		Talking Machines;
1,191,275	July 18	Edison, Phonograph or Talking Machine;
1,191,802	July 18	Warren, Sound Reproducer;
1,192,022	July 22	Woods, Speed Governor;
1,192,222	July 22	Kalish, Sound Box;
1,192,327	July 22	Woods, Sound Box for Phonograph;
1,192,402	July 22	Edison, Musical Instrument;
1,192,527	July 22	Edison, Method of Manufacturing
		Sound Record Tablets;
1,192,528	July 22	Crawford, Device for Reproducing
		Sound;
1,192,529	July 22	Stearns, Sound Box;
1,192,534	July 22	Stearns, Sound Reproducing Box;
1,192,535	July 22	Jones, Sound Box for Talking Mach-
		ines;

- 1,193,242, Aug. 1, Delany, Phonograph;
1,193,266, Aug. 1, Howard, Automatic Stop Mechanism
for Talking Machines;
1,193,350, Aug. 1, Blood, Phonograph Controlling De-
vice;
1,193,762, Aug. 8, Christensen, Sound Reproducing
Machine for Advertising Purposes;
1,193,825, Aug. 8, Roop, Phonograph;
1,193,995, Aug. 8, Collins, Resonant Body;
1,194,056, Aug. 8, Van Vleck Morse, Diaphragms for
Phonographs and Talking Machines;
1,194,448, Aug. 15, Dyer, Phonograph or Talking Mach-
ine;
1,194,573, Aug. 15, Tangeman, Acoustic Needle Mounting;
1,194,708, Aug. 15, Buckwalter, Counterbalance for
Hinged Covers;
1,194,795, Aug. 15, Tyler & Capps, Matrix for Pressing
Sound Records;
1,194,805, Aug. 15, Woods, Automatic Lid Support;
1,194,855, Aug. 15, Marcus, Talking Clock or the Like;
1,195,101, Aug. 15, Schiffman, Apparatus for Cutting
Grooves in Record Disks;
1,195,200, Aug. 22, Gantz, Stopping Device for Graph-
ophones;
1,195,783, Aug. 22, Crawford, Sound Amplifier;
1,196,265, Aug. 29, Murray et al., Brake for Talking
Machines;
1,196,366, Aug. 29, Jones, Non-Resonant Music Cabinet;
1,196,448, Aug. 29, English, Talking Machine;
1,196,672, Aug. 29, Ertuck, Means for Automatically
Stopping Gramophones;
1,196,899, Sept. 5, Sturts, Talking Machine;
1,196,966, Sept. 5, Molyneux, Winding Mechanism for
Talking Machine Motors;
1,197,124, Sept. 5, Hoschke, Brake for Talking Machines;
1,197,165, Sept. 5, Whiteman, Jr., Stylus for Talking
Machines and Process of Making Same;
1,197,497, Sept. 5, Johnson et al., Switch;
1,197,722, Sept. 12, Durand, Sound Modifier;
1,197,782, Sept. 12, Weber, Sound Box;
1,198,127, Sept. 12, Herrman, Sweeper for Records of
Talking Machines;
1,198,265, Sept. 12, Parnall, Convertible Sound Box;
1,198,416, Sept. 19, Cheney, Sound Reproducing Machine;
1,198,464, Sept. 19, Lumiere, Talking Machine;
1,198,636, Sept. 19, Huseby, Talking Machine;
1,198,695, Sept. 19, Brennan, Motor to Control Auto-
matically a Subscriber's Telephone for
Varied Service;
1,198,782, Sept. 19, Shafran, Cabineted Phonograph;
1,198,844, Sept. 19, Hawthorne, Acoustic Apparatus;
1,198,904, Sept. 19, Foote, Phonograph Motor Winding
Device;

- 1,198,977, Sept. 19, Vignali, Gramophone;
- 1,199,040, Sept. 26, Adams, Reproducer Attachment for Phonographs;
- 1,199,192, Sept. 26, Krauss, Talking Machine;
- 1,199,196, Sept. 26, McGonigle, Sound Transmitting Device;
- 1,199,197, Sept. 26, Marshall, Tone Purifier for Talking Machines;
- 1,199,206, Sept. 26, Rutzen, Scratch Muffler for Sound Reproducing Machines;
- 1,199,304, Sept. 26, Resch, Diaphragm;
- 1,199,968, Oct. 3, Delany, Sound Reproducing and Recording Machine;
- 1,200,100, Oct. 3, Goodrich, Control Attachment for Dictating-Phonographs;
- 1,200,142, Oct. 3, Schoonmaker, Stop Mechanism;
- 1,200,154, Oct. 3, Wisniewski, Playing-Record Brush;
- 1,200,212, Oct. 3, Miller, Gage for Sound-Boxes;
- 1,201,449, Oct. 17, Edison, Sound Modifying Device;
- 1,201,751, Oct. 17, Mykins, Automatic Stop Mechanism for Sound Reproducing Machines;
- 1,201,958, Oct. 17, Halls et al., Resonant Diaphragm;
- 1,202,213, Oct. 24, Prout, Sound Reproducing Machine;
- 1,202,428, Oct. 24, Rennell, Record Cleaning Attachment for Phonographs;
- 1,202,520, Oct. 24, Hoffay, Sound Box;
- 1,202,521, Oct. 24, Hoffay, Gramophone and the Like Machine;
- 1,202,638, Oct. 24, Adom, Composition for Making Sound-Records;
- 1,202,739, Oct. 24, Knippenberg, Stylus for Talking Machines;
- 1,202,843, Oct. 31, Hoffay, Device for Use in the Manufacture of Gramophone, Phonograph, and the Like Sound Boxes;
- 1,202,973, Oct. 31, Delany, Talking Machine;
- 1,203,088, Oct. 31, Woods, Start and Stop Device for Talking Machines;
- 1,203,119, Oct. 31, Kirkman, Stop for Talking Machines;
- 1,203,172, Oct. 31, Behm, Apparatus for Measuring or Recording Oscillations, Impulses, and the Like;
- 1,203,190, Oct. 31, Fritts, Recording and Reproduction of Pulsations or Variations in Sounds and Other Phenomena;
- 1,203,418, Oct. 31, Scott, Brake for Talking Machines;
- 1,203,666, November 7, Walker, Phonograph;
- 1,203,667, Nov. 7, Walker, Phonograph;
- 1,203,947, Nov. 7, Whitehouse, Machine for Making Seamless Celluloid Articles;
- 1,204,091, Nov. 7, Von Madaler, Apparatus for Preparing Combined Cinematographic and Phonographic Records;
- 1,204,096, Nov. 7, Waller, Metal Sheet for Acoustic Purposes and Method of Making Same;

- 1,204,197, Nov. 7, Scotford, Sound Box;
1,204,341, Nov. 7, Chisholm, Phonograph Attachment;
1,204,420, Nov. 14, Edison, Sound Box;
1,204,826, Nov. 14, Schiessler, Submarine Signaling
Apparatus;
1,204,859, Nov. 14, Grupe, Brake for Talking Machines;
1,204,860, Nov. 14, Grupe, Universally Flexible Brake;
1,204,861, Nov. 14, Grupe, Brake for Talking Machines
and the Like;
1,205,407, Nov. 21, Sullivan, Attachment for Talking
Machines;
1,205,572, Nov. 21, Shelton, Winder for Spring Motors;
1,205,627, Nov. 21, Hinckley & Larsen, Tone Arm Mounting
For Talking Machines;
1,205,631, Nov. 21, Horton, Driving Apparatus for Phono-
graphs;
1,205,915, Nov. 21, Mayer, Tone Controller;
1,206,013, Nov. 28, Manson, Phonograph;
1,206,034, Nov. 28, Sanders, Method of Producing Disk
Sound Records;
1,206,053, Nov. 28, Thompson, Telephonic Fire Alarm
Apparatus;
1,206,168, Nov. 28, Tackmann, Reproducer Attachment;
1,206,462, Nov. 28, Nott, Automatic Alarm for Dictat-
ing Machines;
1,206,635, Nov. 28, Woods, Sound Box for Talking Mach-
ines;
1,206,684, Nov. 28, Eynon, Process of Producing Phono-
graph Records;
1,206,881, Dec. 5, Miller, Method of Making Diaphragms;
1,206,987, Dec. 5, Clausen, Dictating Phonograph System;
1,207,350, Dec. 5, Wahlquist et al., Reproducing Needle;
1,207,383, Dec. 5, Edison, Sound Record Tablet;
1,207,387, Dec. 5, Fessenden, Apparatus and Method for
Producing Vibratory Motions;
1,207,404, Dec. 5, Holland, Phonograph Reproducer;
1,207,589, Dec. 5, May, Automatic Stop for Sound Re-
producing Machines;
1,207,685, Dec. 5, Johnson, Device for Recording Tele-
phone Conversations;
1,207,986, Dec. 12, Nystrom, Brake Mechanism for Talk-
ing Machines;
1,208,346, Dec. 12, Marsh, Disk Record Holder;
1,208,455, Dec. 12, Bedford, Automatic Winding Device
for Phonographs;
1,208,561, Dec. 12, Huff, Sound Box Attachment for
Phonographs;
1,208,603, Dec. 12, Markels, Adjustable Tone Arm and
Sound Box Coupling;
1,208,749, Dec. 19, Cirelli, Automatic Brake for Talk-
ing Machines;
1,208,839, Dec. 19, Salfisberg, Handle Device;
1,208,844, Dec. 19, Scully, Holder for Talking Machine
Records;
1,208,900, Dec. 19, Blackman, Talking Machine Needle Maga-
zine;
1,209,307, Dec. 19, Kraft, Driving Mechanism for Phono-
graphs;

- 1,209,441, Dec. 19, Huseby, Talking Machine Amplifier;
- 1,209,464, Dec. 19, Markels, Universal Tone Arm;
- 1,209,852, Dec. 26, Kotterman, Illuminating Device for
Talking Machine Records;
- 1,209,891, Dec. 26, Scully, Dictaphone Attachment;
- 1,210,138, Dec. 26, Benedict, Talking Machine;
- 1,210,195, Dec. 26, Murphy, Automatic Stop for Talk-
ing Machines;
- 1,210,248, Dec. 26, Woods, Graphophone;

ALPHABETICAL LIST
OF
PATENTEES.

GRAPHOPHONE PATENTS - VOLUME XVII.

1916.



(Alphabetical list of Patentees)

VOLUME XVII.

GRAPHOPHONE PATENTS.

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July to December, 1916.

Adair, M.,	1,189,222;
Adair, M.,	1,189,418;
Adams, W.G.,	1,199,040;
Adom, M.B.,	1,202,638;

Bedford, G.,	1,208,455;
Behm, A.,	1,203,172;
Benedict, B.,	1,210,138;
Blackman, M.,	1,208,900;
Blood, B.B.,	1,193,350;
Brennan, E.V.M.,	1,198,695;
Buckwalter, D.T.,	1,194,708;
Burns, W.J.,	1,190,510;

Capps & Tyler,	1,194,795;
Cheney, F.,	1,198,416;
Chisholm, C.L.,	1,204,341;
Christensen, E.L.,	1,193,762;
Cirelli, F.,	1,208,749;
Clair, O.J.,	1,190,728;
Clausen, H.P.,	1,206,987;
Clawson, C.Y.,	1,190,112;
Collins, J.H.,	1,193,995;
Crawford, W.H.,	1,192,828;
Crawford, W.H.,	1,195,783;

Delaney, P.B.,	1,190,249;
Delany, P.B.,	1,190,635;
Delany, P.B.,	1,190,636;
Delany, P.B.,	1,191,674;
Delany, P.B.,	1,191,675;
Delany, P.B.,	1,193,242;
Delany, P.B.,	1,199,968;
Delany, P.B.,	1,202,973;
Durand, N.C.,	1,197,722;
Dyer, F.L.,	1,194,488;

Edison, T.A.,	1,190,133;
Edison, T.A.,	1,201,449;
Edison, T.A.,	1,204,420;

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Edison, T.A.,	1,207,383;
Emerson, V.H.,	1,192,402;
English, J.C.,	1,192,289;
English, J.C.,	1,196,448;
Ertuck, F.,	1,196,672;
Eynon, T.,	1,206,684;

Fessenden, R.A.,	1,207,387;
Foots, L.,	1,198,904;
Freeman, C.D.,	1,190,748;
Fritts, C.E.,	1,203,190;

Gantz, A.,	1,195,200;
Goodrich, R.B.,	1,200,100;
Grupe, W.F.,	1,204,859;
Grupe, W.F.,	1,204,860;
Grupe, W.F.,	1,204,861;

Hall & Ryan,	1,201,958;
Hall & Wahlquist,	1,207,350;
Hawthorne, E.A.,	1,198,844;
Herrman, A.,	1,198,127;
Heymann, W.,	1,191,182;
Hinckley & Larson,	1,205,627;
Hoffay, J.,	1,202,520;
Hoffay, J.,	1,202,521;
Hoffay, J.,	1,202,843;
Holland, N.H.,	1,207,404;
Horton, A.A.,	1,205,631;
Hoschke, W.H.,	1,197,124;
Howard, S.R.,	1,193,266;
Huff, S.E.,	1,208,561;
Hughes, J.W.,	1,191,003;
Huseby, A.A.,	1,198,636;
Huseby, A.A.,	1,209,441;

Johnson & Murray,	1,197,497;
Johnston, G.,	1,207,685;
Jones, A.D.,	1,192,836;
Jones, A.D.,	1,196,366;

Kirkman, T.W.,	1,203,119;
Knippenberg, A.,	1,202,739;
Kotterman, C.A.,	1,209,852;
Kraft, F.,	1,209,307;
Krauss, M.,	1,199,192;

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LaRue & Murray,	1,196,265;
Larson & Hinckley,	1,205,627;
Little, T.J., Jr.,	1,191,202;
Lumiere, L.,	1,198,464;
Lutz, H.J.,	1,189,592;

Marcus, M.,	1,194,855;
Markels, L.,	1,208,603;
Markels, L.,	1,208,464;
Marquis, A.G.,	1,191,808;
Marsh, C.W.,	1,208,346;
Marshall, C.P.,	1,199,197;
Manson, D.M.,	1,206,013;
May, A.,	1,207,589;
Mayer, A.,	1,205,915;
McGonigle, C.W.,	1,199,196;
Miller, F.B.,	1,190,787;
Miller, H.C.,	1,200,212;
Miller, H.C.,	1,206,881;
Molyneux, G.E.,	1,196,966;
Morse, F.Van V.,	1,194,056;
Murphy, C.H.,	1,210,195;
Murray & Johnson,	1,197,497;
Murray & LaRue;	1,196,265;
Myers, H.A.,	1,192,337;
Mykins, T.E.,	1,201,751;

Nott, S.C.,	1,206,462;
Nystrom, M.,	1,207,986;

Parnall, A.E.,	1,198,265;
Prout, J.T.,	1,202,312;

Ralph, J.E.,	1,190,005;
Rennell, L.E.,	1,202,428;
Repp, C.B.,	1,190,673;
Resch, J.,	1,199,304;
Roop, C.H.,	1,193,825;
Rutzen, A.C.,	1,199,206;
Ryan & Halls,	1,201,958;

Salfisberg, L.L.,	1,208,839;
Sanders, J.,	1,206,034;
Sanders, J.,	1,192,567;
Schiessler, J.,	1,204,826;
Schiffman, R.,	1,195,101;
Schoonmaker, W.H.,	1,200,142;
Scotford, L.K.,	1,204,197;
Scott, C.O.,	1,203,418;
Scully, J.J.,	1,208,844;
Scully, J.J.,	1,209,891;

Shafran, N.,	1,198,782;
Shelton, W.G.,	1,205,572;
Steurer, J.A.,	1,192,833;
Steurer, J.A.,	1,192,834;
Stoiber, H.A.,	1,190,808;
Sturts, C.F.A.,	1,196,899;
Sullivan, W.T.,	1,205,407;

Tackmann, C.E.,	1,206,168;
Tangeman, W.A.,	1,194,573;
Thompson, E.L.,	1,206,053;
Tyler & Capps,	1,194,795;

Vignali, M.,	1,198,977;
Von Madaler, K.,	1,204,091;

Wahlquist, & Hall,	1,207,350;
Walker, E.,	1,203,666;
Walker, E.,	1,203,667;
Waller, P.A.,	1,204,096;
Weber, P.,	1,197,782;
Whitehouse, J.N.,	1,203,947;
Whiteman, L.J., Jr.,	1,197,165;
Wisniewski, S.,	1,200,154;
Woods, C.H.,	1,192,026;
Woods, C.H.,	1,194,805;
Woods, C.H.,	1,203,088;
Woods, C.H.,	1,206,635;
Woods, C.H.,	1,210,248;

Note:- In this Volume there are bound 144 mechanical patents and 39 Design patents, making a total of 183 patents bound herein.

Table with 2 columns and 4 rows of text, likely a list or index.

DESIGN PATENTS ARE BOUND IN BACK OF
THIS VOLUME.

(All of those for 1916.)

(Arranged numerically)

(39 Design patents for 1916)



PHONOGRAPH STOP.

#1,189,222-----M. Adair,

Patented-July 4th, 1916.

Filed-July 30th, 1915.

1,189,222.

M. ADAIR.
 PHONOGRAPH STOP.
 APPLICATION FILED JULY 30, 1915.

Patented July 4, 1916.
 3 SHEETS—SHEET 1.

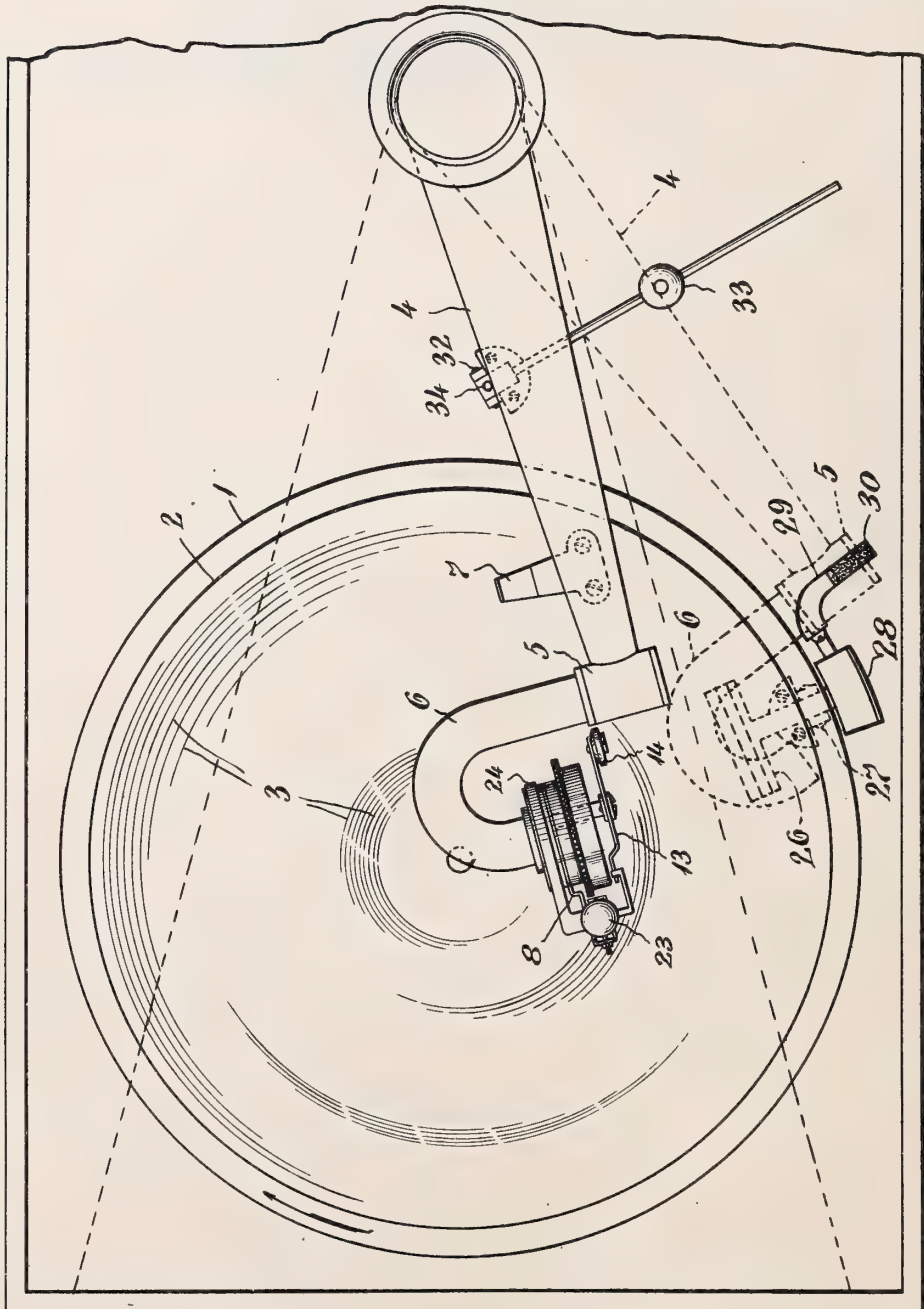


Fig. 1.

Inventor
 Montague Adair
 By his Attorney
 W. L. Brecken

1,189,222.

Patented July 4, 1916.
 3 SHEETS—SHEET 2.

Fig. 2.

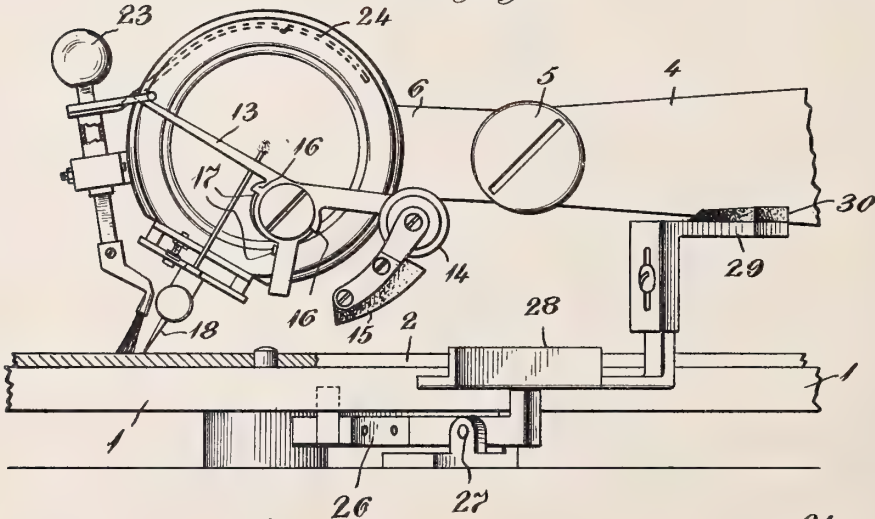


Fig. 3.

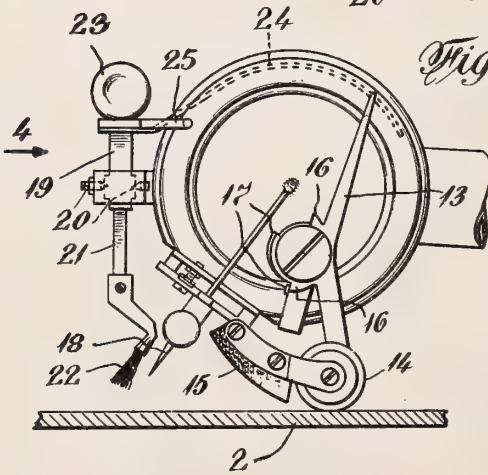
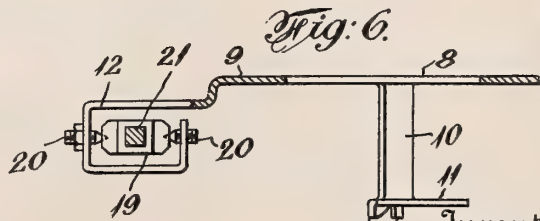
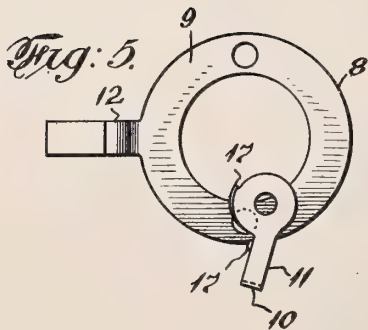
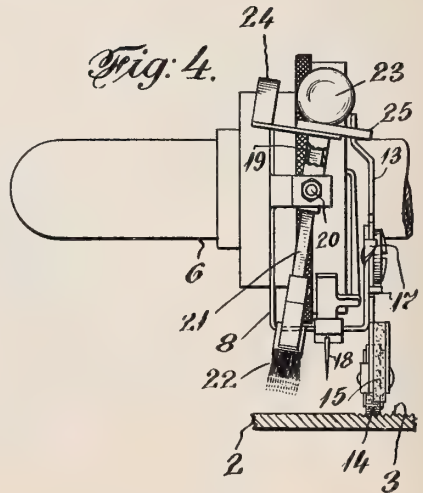


Fig. 4.



Inventor
 Montyue Adair
 By *W. H. Attorney*
 Melv. Becker

1,189,222.

M. ADAIR.
 PHONOGRAPH STOP.
 APPLICATION FILED JULY 30, 1915.

Patented July 4, 1916.
 3 SHEETS—SHEET 3.

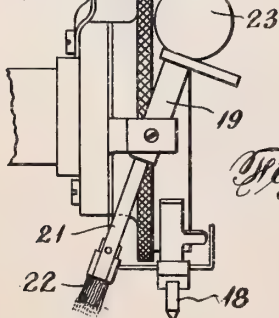
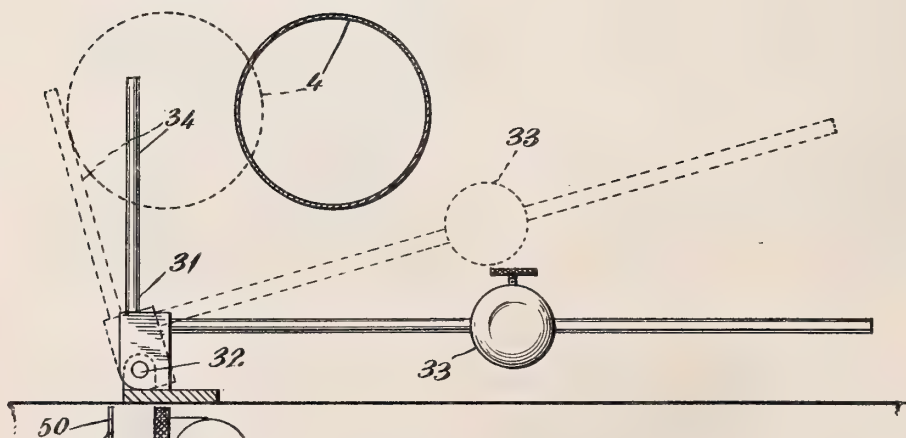
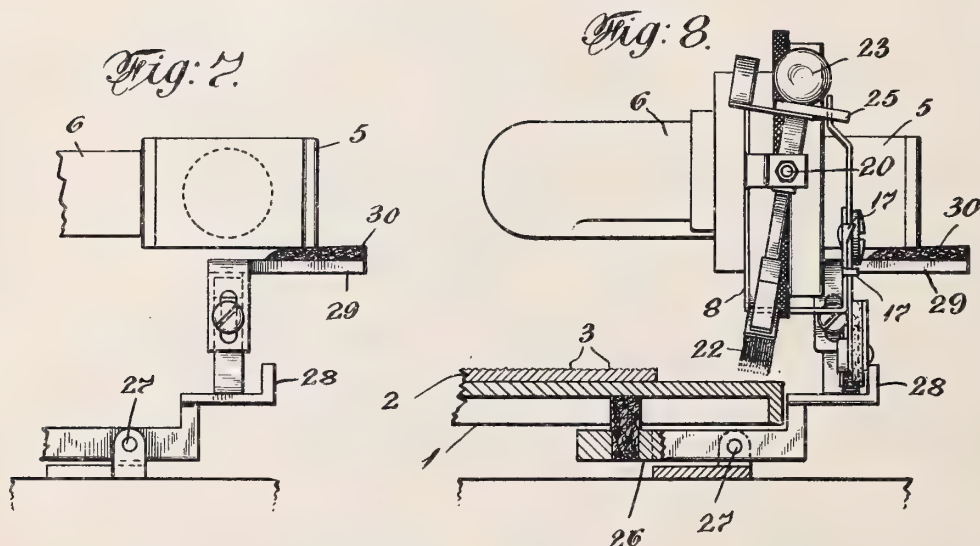


Fig. 9.

Fig. 10.

Inventor
 Montague Adair
 By his Attorney
 Melvick

UNITED STATES PATENT OFFICE.

MONTAGUE ADAIR, OF NEW YORK, N. Y.

PHONOGRAPH-STOP.

1,189,222.

Specification of Letters Patent.

Patented July 4, 1916.

Application filed July 30, 1915. Serial No. 42,733.

To all whom it may concern:

Be it known that I, MONTAGUE ADAIR, a citizen of the United States, and a resident of the borough of Brooklyn, in the county of Kings, city and State of New York, have invented certain new and useful Improvements in Phonograph-Stops, of which the following is a specification.

The present invention relates generally to stop mechanism for phonographs or the like in which there is a rotatable element carrying a record in disk form having a zone of grooves, and a movable element, here the tone arm, which has a motion with respect to the rotatable element during the operation of the machine and which carries the usual sound reproducing stylus.

In an application filed on the 11th of January, 1915, Serial No. 1556, there was disclosed a construction in which a pivotally supported member, there taking the form of a braking element, was mounted on the sound box and normally held in inactive or inoperative position by means of a tilting latch, which tilting latch had a normal bias. Associated with these parts was a non-playing follower or controller engaging the grooves of the record and which prevented the latch from being tilted until the movable element had moved across the zone of grooves, after which the said latch would release the pivotally supported member or braking element and the latter would then engage with the face of the record.

The present invention is an improvement on the construction shown in the said application and has more particularly for its object means whereby a number of the parts comprising the stop or return mechanism may be restored automatically to their normal position by some manipulation of a part of the phonograph necessary during the operation thereof.

Accordingly one feature of this invention is the provision of means whereby the lifting of the sound box or the outer end of the tone arm to position a new record will shift the center of gravity of the parts comprising the stop or return mechanism, thereby restoring them to their original position.

Further, the invention consists in a finger-hold whereby the said elements may be maintained in the position which they have assumed when lowering the sound box to play the next record.

In connection with the foregoing, means

are provided for impeding the movement of the tone arm to prevent undue movement thereof after the sound reproducing stylus has completed playing the record. It is obvious that if such means were not present the sound reproducing stylus would, if the phonograph and consequently the tone arm is slightly tilted in one direction, slide inward toward the center of the record, which would be an objectionable feature.

In the said application Serial No. 1556 the relation between the sound reproducing stylus and the non-playing follower was such that the non-playing follower would have completed its traverse, across the zone of grooves before the sound reproducing stylus had finished its traversing movement. This necessitated very fine adjustment to insure the tilting of the latch at the proper moment, as it can be readily seen that unless the adjustment was very fine, the latch might readily be released before the sound reproducing stylus had finished playing the record.

Accordingly another feature of the present invention resides in the relative positioning of the sound reproducing stylus with respect to the non-playing follower, the arrangement being such that when the sound reproducing stylus has completed its traversing movement across the zone of grooves, the non-playing follower will still be in engagement with the zone of grooves and the continued rotation of the record then serves eventually to tilt and release the braking device. This insures a complete playing of the record before the braking element operates.

Another feature of the invention is an improved braking apparatus in which a pivotally supported member on the sound box engages the face of the record and lifts the sound reproducing stylus off the record but instead of applying the brake directly to the face of the record, the said pivotally supported element is provided with a roller whereby the continued rotation of the record causes a return traversing movement of the tone arm so that the latter is moved transversely of the record preferably out of playing position and eventually on to a braking device, which on account of the weight of the tone arm or sound box engages the record carrier and thus stops the rotation. The means controlling the release of the pivotally supported member is

in turn controlled by the grooves in the record so that, irrespective of the extent of the zone of grooves of the record, the device will operate automatically when the end of the record is reached.

In the accompanying drawings the invention is disclosed in a concise and preferred form from which, however, changes may be made without departing from the spirit and scope of the invention as set forth in the appended claims, and I particularly wish to emphasize that many of the features of the present application are applicable to the structure shown in my said prior application in which the pivotally supported member on the sound box acts as the braking element.

In said drawings: Figure 1 is a plan view showing a phonograph of a conventional type with my invention attached in position. Fig. 2 is a side elevation of the outer end of the tone arm showing that portion of the stop mechanism which is carried by the sound box and showing also a portion of the record carrier and the braking element of the stop mechanism associated therewith; the parts are shown as they appear during the playing of a record. Fig. 3 is a view substantially like Fig. 2 but showing less of the machine and with the device tripped and in the act of effecting the return traversing movement of the sound box. Fig. 4 is a view looking in the direction of the arrow 4, Fig. 3. Fig. 5 is a detail view of the bracket by means of which my device is attached to the sound box. Fig. 6 is a view partly in section of said bracket and showing also the tilting guide and the controlling element extending therethrough. Fig. 7 is a detail view showing the tone arm resting on the braking element to actuate the latter. Fig. 8 is a more complete view than Fig. 7, showing the braking element engaging the record carrier, and the tone arm and elements carried thereby engaging the braking element. Fig. 9 is a detail view showing the means for impeding the traversing movement of the tone arm and showing the latter indicated diagrammatically. Fig. 10 is a view similar to Fig. 4 showing a modification.

Similar characters of reference indicate corresponding parts in the different views.

1 is a rotatable record carrier carrying a record 2 of disk form and having a zone of grooves 3 extending between the beginning of the record, adjacent the periphery of the same, and the end of the record near the center thereof. 4 is the usual tone arm having a pivotal connection 5 in it so that the outer end 6 thereof supporting the sound box may be swung up and placed on the supporting clip 7 in a known manner when changing from one record to the other. The sound box has secured to it in a suitable manner

the bracket 8 on which the attachment comprising parts of my invention is mounted. The bracket 8 consists of an annular main member 9 which extends on one side of the sound box and a projecting extension 10 which passes underneath the sound box and has an arm 11 which rises on the other side of the sound box.

Connected to the member 9 is a bearing portion 12 which is bent backward upon itself and extends forwardly of the sound box. Pivotally supported in the arm 11 is the member 13 which has a normal bias in one direction, that is to say, in a downward direction, and which in the present preferred form is provided with a roller 14 at its lower end which will engage the face of the record 3. The member 13 also has a shoe 15 which comes in contact with the face of the record when the said member is released and which is preferably of very soft rubber so that the movement of the member 13 in striking the record may be softened as much as possible. Suitable stops 16 are provided on the pivotally supported member 13 adapted to engage with the stops 17 on the arm 11.

18 indicates the sound reproducing stylus. 19 is a tilting guide mounted for tilting on the bearings 20 in the member 12. Extending through said guide is a sliding member 21, the lower end of which is in the form of a non-playing follower 22, here shown as a brush, and the upper end 23 of which is weighted so as to maintain a bias of the parts in a certain direction while the record is playing. Extending from the tilting guide 19 is a finger-hold 24 whose function will appear as the specification proceeds. The tilting guide 19 is provided with a latch 25 which serves to hold the member 13 with the roller 14 in its elevated position so long as the non-playing follower 22 is in engagement with the record and therefore prevented from being tilted.

Adjacent to the record carrier 1 is a brake 26 pivotally supported at 27 and having a supporting ledge 28 and an upwardly extending receiving portion 29 preferably faced with rubber 30.

Located in the path of the traversing movement of the tone arm is an impeding means, taking here the form of a bell crank 31 pivoted at 32 and having a weighted portion 33 and an upstanding arm 34 against which the tone arm 4 comes in contact and which prevents undue movement of the tone arm after the sound reproducing stylus has completed playing the record.

The last described feature is made necessary because of the relative arrangement of the sound reproducing stylus 18 and the non-playing follower 22. These parts are so arranged with respect to each other that the sound reproducing stylus will complete

playing the record and will have finished its traversing movement while the non-playing follower or controller 22 is still in engagement with the grooves of the record.

5 Assuming the parts to have been placed in proper playing position, as shown in Fig. 2 for instance, the tone arm will traverse the record and eventually the sound reproducing stylus will reach the innermost grooves in the record. The rotation of the record will continue. Meanwhile the tone arm will have engaged the impeding means 31 which will restrain any undue inward movement of the tone arm. The non-playing follower will still be in engagement with the grooves of the record and will therefore keep the latch from tilting, but eventually the rotating movement of the record will cause the tilting latch to be overbalanced, thereby causing the latch to disengage the end of the member 13 and permitting the latter to move into engagement with the face of the record. The continued rotating movement of the record will now act upon the roller 14 to rotate the latter and this rotation will have the effect of causing a return transverse movement of the tone arm, thereby moving it transversely of the record until the roller 14 is moved completely off the record and comes to rest upon the ledge 28. This will also have brought the tone arm up on the receiving portion 29, thereby actuating the brake member 26 to engage the under side of the record carrier, thus stopping the same. It should be added that when the member 13 was released and brought into engagement with the record, the sound reproducing stylus 18 was lifted out of engagement with the record. I wish it to be understood that the roller 14 need not necessarily carry the tone arm off the record. It may simply traverse the record a certain distance and stop the rotation of the record by the weight of the tone arm. Different results can be obtained by adjusting the pitch of the roller 14.

If the outer end 6 of the tone arm is now turned around its pivotal support 5 and brought to rest on the bracket 7, it is evident that the center of gravity of the elements carried by the sound box will be shifted as a group, with the result that the member 13 and the tilting guide 19 will be restored to their original position with respect to each other, and the latch 25 will fall in behind the outer end of 13. When it is now desired to play a record again, the outer end of the tone arm will be lowered and the elements carried thereby will be brought into engagement with the record. In order to maintain the parts in their restored position the fingerhold 24 is grasped at the time that the parts are positioned for playing.

In Fig. 10 is shown a modification of the invention, which consists in dispensing with

the fingerhold 24 mounted on the tilting guide 19. Instead of having this member 24, I provide a fingerhold 50 which is stationary with the sound box. This form of the invention is more convenient than the other because when returning the parts to playing position the operator naturally grasps both the fingerhold 50 and the weight 23 thereby keeping the latter in its raised position. This leaves the sound reproducing stylus in full view of the operator and does not necessitate a rising movement of the member 21 in the tilting guide when lowering the device into engagement with the record.

What is claimed, is:

1. The combination with a phonograph having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound reproducing stylus, of means, normally inoperative, for automatically lifting the sound reproducing stylus off the record and for moving the tone arm transversely of the record out of playing position, and means engaging the record grooves for rendering said automatic means operative upon the completion of the playing of the record irrespective of the extent of the zone of grooves in the record.

2. The combination with a phonograph having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound reproducing stylus, of means, normally inoperative, for automatically lifting the sound reproducing stylus off the record and for moving the tone arm transversely of the record out of playing position, means engaging the record grooves for rendering said automatic means operative upon the completion of the playing of the record irrespective of the extent of the zone of grooves in the record, and means for stopping the rotation of the record carrier controlled by the transverse movement of the tone arm out of playing position.

3. The combination with a phonograph having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound reproducing stylus, of means carried by the tone arm, normally inoperative, for automatically lifting the sound reproducing stylus off the record and for moving the tone arm transversely of the record out of playing position, and means controlled by the record grooves for rendering said automatic means operative upon the completion of the playing of the record irrespective of the extent of the zone of grooves in the record.

4. The combination with a phonograph having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound

reproducing stylus, of means carried by the tone arm, normally inoperative, for automatically lifting the sound reproducing stylus off the record and for moving the tone arm transversely of the record out of playing position, means controlled by the record grooves for rendering said automatic means operative upon the completion of the playing of the record irrespective of the extent of the zone of grooves in the record, and means for stopping the rotation of the record carrier controlled by the transverse movement of the tone arm out of playing position.

5. The combination with a phonograph having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound reproducing stylus, of means, normally inoperative, for automatically engaging with the record to lift the sound reproducing stylus off the record and for moving the tone arm transversely of the record out of playing position, and means controlled by the record grooves for rendering said automatic means operative upon the completion of the playing of the record irrespective of the extent of the zone of grooves in the record.

6. The combination with a phonograph having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound reproducing stylus, of means, normally inoperative, for automatically engaging with the record to lift the sound reproducing stylus off the record and for moving the tone arm transversely of the record out of playing position, means controlled by the record grooves for rendering said automatic means operative upon the completion of the playing of the record irrespective of the extent of the zone of grooves in the record, and means for stopping the rotation of the record carrier controlled by the transverse movement of the tone arm out of playing position.

7. The combination with a phonograph having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound reproducing stylus, of means carried by the tone arm, normally inoperative, for automatically engaging with the record to lift the sound reproducing stylus off the record and for moving the tone arm transversely of the record out of playing position, and means controlled by the record grooves for rendering said automatic means operative upon the completion of the playing of the record irrespective of the extent of the zone of grooves in the record.

8. The combination with a phonograph having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound

reproducing stylus, of means carried by the tone arm, normally inoperative, for automatically engaging with the record to lift the sound reproducing stylus off the record and for moving the tone arm transversely of the record out of playing position, means controlled by the record grooves for rendering said automatic means operative upon the completion of the playing of the record irrespective of the extent of the zone of grooves in the record, and means for stopping the rotation of the record carrier controlled by the transverse movement of the tone arm out of playing position.

9. The combination with a phonograph having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound reproducing stylus, of a member having a roller, normally inoperative, for automatically engaging the record to lift the sound reproducing stylus off the record and for moving the tone arm transversely of the record by the rotation thereof out of playing position, and means controlled by the record grooves for rendering said member and roller operative upon the completion of the playing of the record irrespective of the extent of the zone of grooves in the record.

10. The combination with a phonograph having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound reproducing stylus, of a member having a roller, normally inoperative, for automatically engaging the record to lift the sound reproducing stylus off the record and for moving the tone arm transversely of the record by the rotation thereof out of playing position, means controlled by the record grooves for rendering said member and roller operative upon the completion of the playing of the record irrespective of the extent of the zone of grooves in the record, and means for stopping the rotation of the record carrier controlled by the transverse movement of the tone arm out of playing position.

11. The combination with a phonograph having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound reproducing stylus, of a member having a roller, carried by the tone arm and normally inoperative, for automatically engaging with the record to lift the sound reproducing stylus off the record and for moving the tone arm transversely of the record by the rotation thereof out of playing position, and means controlled by the record grooves for rendering said member and roller operative upon the completion of the playing of the record irrespective of the extent of the zone of grooves in the record.

12. The combination with a phonograph

having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound reproducing stylus, of a member having a roller, carried by the tone arm and normally inoperative, for automatically engaging with the record to lift the sound reproducing stylus off the record and for moving the tone arm transversely of the record by the rotation thereof out of playing position, means controlled by the record grooves for rendering said member and roller operative upon the completion of the playing of the record irrespective of the extent of the zone of grooves in the record, and means for stopping the rotation of the record carrier controlled by the transverse movement of the tone arm out of playing position.

13. The combination with a phonograph having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound reproducing stylus, of a member carried by the tone arm and adapted to engage the face of the record but normally inoperative, a latch for normally holding said member inoperative, and a non-playing follower, for preventing the latch from releasing the member, for engaging the record during the playing and until after the sound reproducing stylus has traveled entirely across the zone of grooves when the continued movement of the record causes the non-playing follower to permit the latch to release the member.

14. The combination with a phonograph having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound reproducing stylus, of a member carried by the tone arm and adapted to engage the face of the record but normally inoperative, a tilting latch for normally holding said member inoperative, and a non-playing follower for preventing the latch from tilting to release the member for engaging the record during the playing and until after the sound reproducing stylus has traveled entirely across the zone of grooves when the continued movement of the record causes the non-playing follower to permit the latch to release the member.

15. The combination with a phonograph having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound reproducing stylus, of a pivotally supported member carried by the tone arm and adapted to engage the face of the record but normally inoperative, a latch mounted to tilt at an angle to the pivotal movement of the pivotally supported member and having a bias in one direction, a controller for normally holding the latch in its latched position but

which when operated tilts the latch and releases the pivotally supported member, and means whereby the center of gravity of said elements as a group may be shifted to permit said elements to assume their normal position with respect to each other.

16. The combination with a phonograph having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound reproducing stylus, of a pivotally supported member carried by the tone arm and adapted to engage the face of the record but normally inoperative, a latch mounted to tilt at an angle to the pivotal movement of the pivotally supported member and having a normal bias in one direction, a sliding controller for normally holding the latch in its latched position but which when operated tilts the latch and releases the pivotally supported member, all of said elements being carried on the tone arm, and a pivotal connection in said tone arm to permit the outer end thereof, to be elevated so that when elevated the elements will assume their normal position with respect to each other.

17. The combination with a phonograph having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound reproducing stylus, of a pivotally supported member carried by the tone arm and adapted to engage the face of the record but normally inoperative, a latch mounted to tilt at an angle to the pivotal movement of the pivotally supported member and having a normal bias in one direction, a sliding controller for normally holding the latch in its latched position but which when operated tilts the latch and releases the pivotally supported member, all of said elements being carried on the tone arm, a pivotal connection in said tone arm to permit the outer end thereof to be elevated so that when elevated the elements will assume their normal position with respect to each other, and a finger-hold for maintaining said elements in the position which they have assumed during the lowering of said outer pivotally supported end of the tone arm.

18. The combination with a phonograph having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound reproducing stylus, of a pivotally supported member having a bias in one direction and adapted to engage the face of the record but normally inoperative, a latch mounted to tilt at an angle to the pivotal movement of the pivotally supported member and also having a normal bias in one direction, a sliding controller for normally holding the latch in its latched position but which when operated tilts the latch and releases the pivotally supported member, all

of said elements being carried by the tone arm, and a pivotal connection in the tone arm substantially parallel with the pivotal support of the pivotally supported member
5 whereby when the outer end of the tone arm is elevated said elements are permitted to assume their normal position with respect to each other.

19. The combination with a phonograph
10 having a rotatable record carrier for supporting a record in disk form having a zone of grooves, and a tone arm having a sound reproducing stylus, of a pivotally supported member having a bias in one direction and
15 adapted to engage the face of the record but normally inoperative, a latch mounted to tilt at an angle to the pivotal movement of the pivotally supported member and also having a normal bias in one direction, a
20 sliding controller for normally holding the

latch in its latched position but which when operated tilts the latch and releases the pivotally supported member, all of said elements being carried by the tone arm, a pivotal connection in the tone arm substantially parallel with the pivotal support of the pivotally supported member whereby
25 when the outer end of the tone arm is elevated said elements are permitted to assume their normal position with respect to each
30 other, and a finger-hold for maintaining said elements in the position which they have assumed when lowering the said outer end of the tone arm.

Signed at New York city, in the county of
New York and State of New York, this 29th
day of July, A. D. 1915.

MONTAGUE ADAIR.

Witness:

AXEL V. BEEKEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

GRAPHOPHONE PATENT.

PHONOGRAPH STOP,
#1,189,418-----M. Adair
Patented-July 4th, 1916.
Filed-Jan. 27th, 1916.

M. ADAIR.
 PHONOGRAPH STOP.
 APPLICATION FILED JAN. 27, 1916.

1,189,418.

Patented July 4, 1916.

3 SHEETS—SHEET 1.

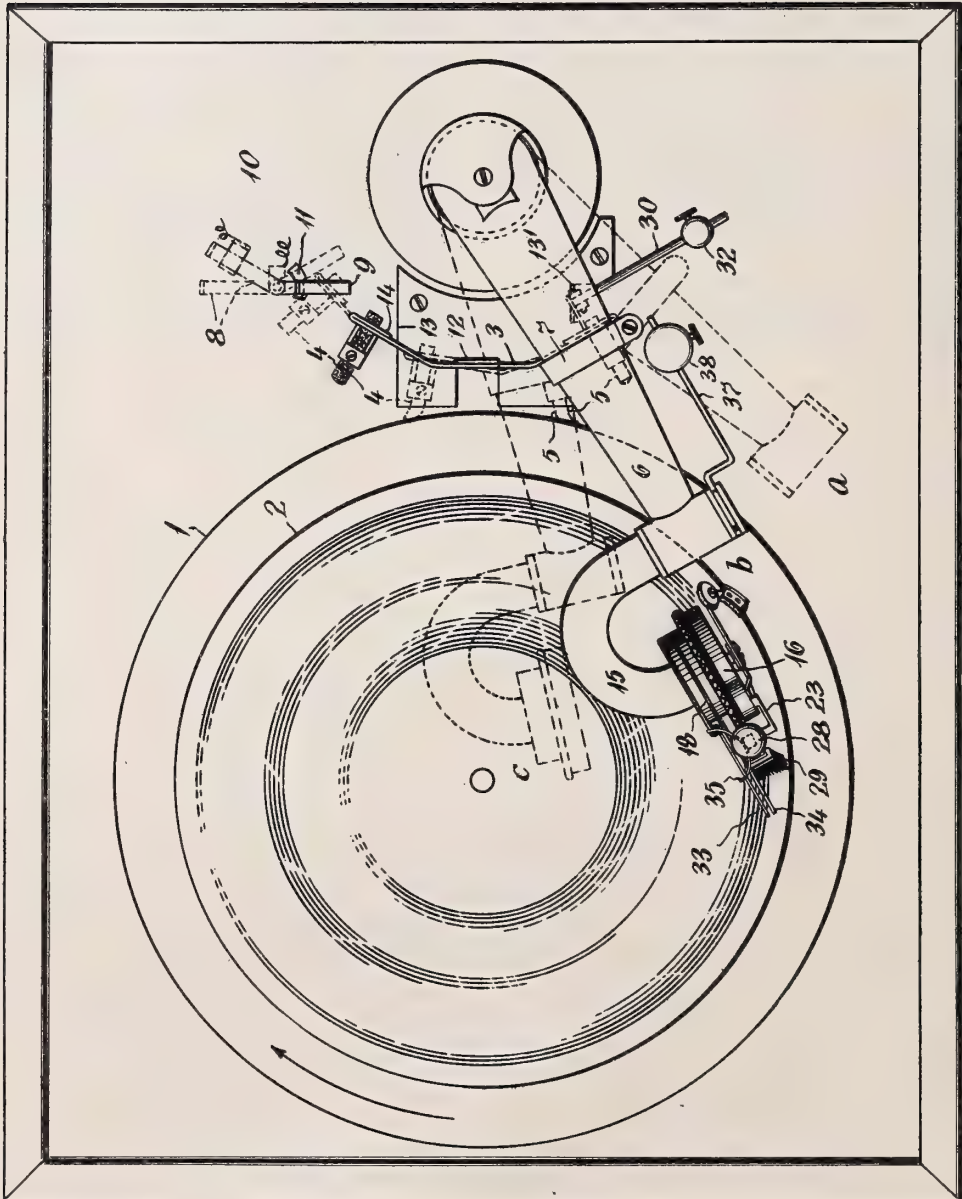


Fig. 1.

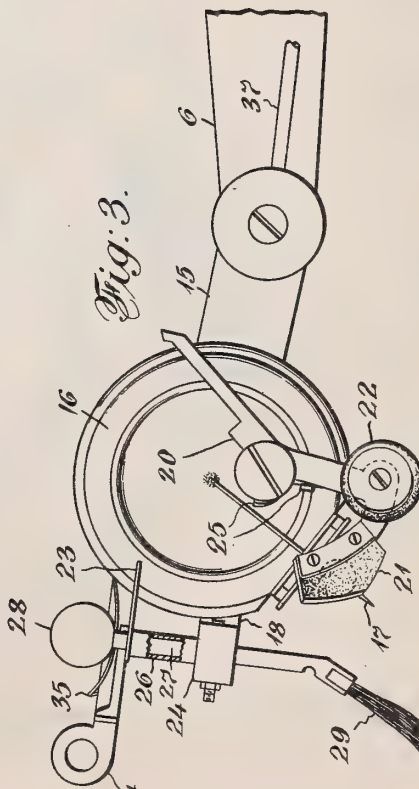
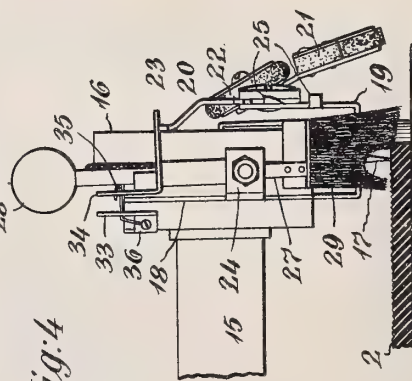
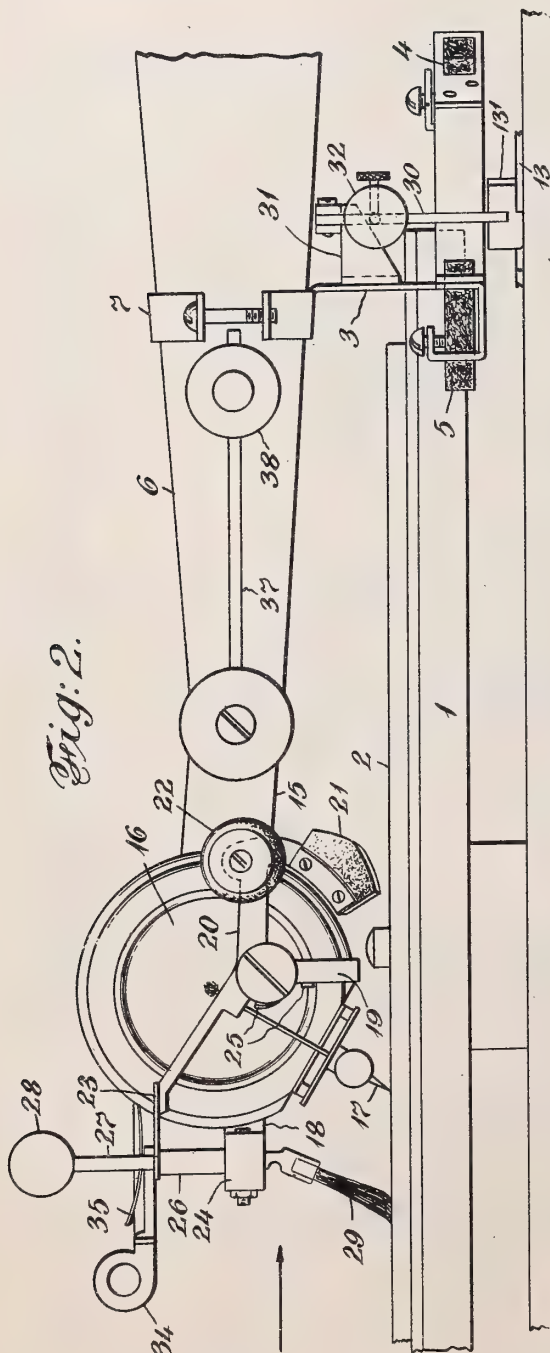
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 By his Attorney
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1,189,418.

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3 SHEETS—SHEET 2.



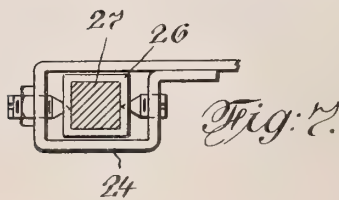
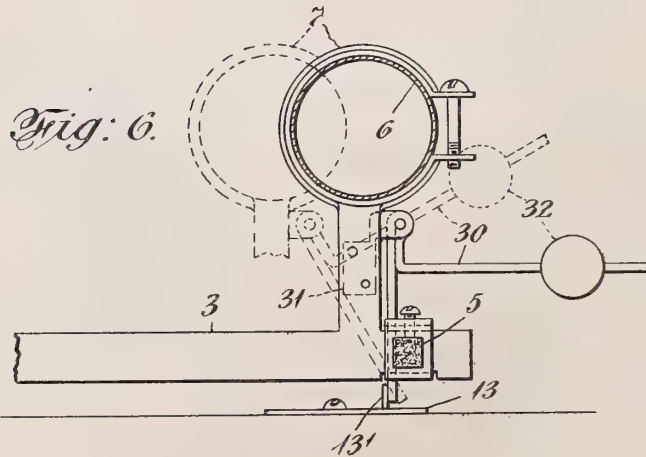
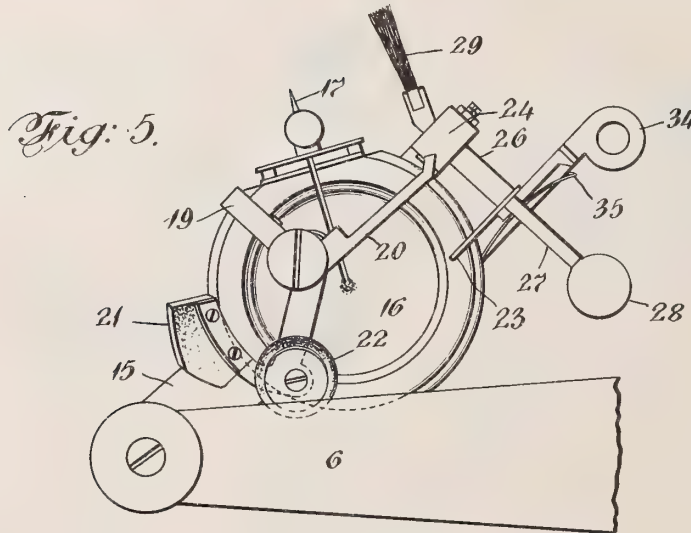
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1,189,418.

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3 SHEETS—SHEET 3.



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 Montague Adair
 By his Attorneys
 J. W. Becken

UNITED STATES PATENT OFFICE.

MONTAGUE ADAIR, OF NEW YORK, N. Y.

PHONOGRAPH-STOP.

1,189,418.

Specification of Letters Patent.

Patented July 4, 1916.

Application filed January 27, 1916. Serial No. 74,682.

To all whom it may concern:

Be it known that I, MONTAGUE ADAIR, a citizen of the United States, and a resident of the borough of Brooklyn, in the county of Kings, city and State of New York, have invented certain new and useful Improvements in Phonograph-Stops, of which the following is a specification.

This invention relates generally to stopping mechanisms for sound reproducing devices, and more particularly to that type of sound reproducer in which the record takes the form of a disk.

In my application filed Jan. 11, 1915, Serial No. 1556, there was disclosed a construction in which a pivotally supported braking element was mounted on the sound box and normally held in inoperative position by means of a pivotally mounted latch, also carried on the sound box. The pivoted latch had a bias to brake releasing position but was restrained from taking this position while the sound box was moving across the groove zone by the engagement with the groove of the record of a non-playing follower. When the sound box had reached the termination of the groove zone, the non-playing follower would be held at the margin of the groove zone to bring about the release of the braking element which would thereupon swing into engagement with the face of the record to stop the rotation thereof. At the same time that the braking mechanism was operated, the stylus was lifted from its playing position in contact with the record.

In my application filed July 30, 1915, Serial No. 42,733, there was disclosed a modification of the earlier one in which substantially the same mechanism was mounted on the sound box for lifting the needle. However, instead of causing the record to be brought to a stop by the engagement of a member carried by the sound box with the face of the record, a roller was added which operated by its engagement with the rotating record to carry the sound box to a position at the periphery of the record and into engagement with a separate braking device

which thereupon stopped the rotation of the record carrier.

The present application discloses a further improvement of the devices disclosed in the foregoing applications in which substantially the same parts are again mounted on the sound box but in this instance a pair of braking devices are carried directly by the tone arm. Also the roller which is made use of in this instance is arranged to carry the sound box toward the center of this record instead of to the periphery thereof and in this central position causes one of the braking devices to directly engage the record carrier to stop the rotation thereof. The remaining of the two braking devices on the tone arm is arranged to engage the record carrier when the tone arm is moved to a position in which the record disks can be exchanged.

In the accompanying drawings an embodiment of the invention is shown in which substantially the same stopping device controlling mechanism is employed that is characteristic of the devices shown in the prior applications to which reference has been made.

In the drawings: Figure 1 is a plan view of a preferred embodiment of the invention showing the braking device in a plurality of positions. Fig. 2 is a side elevation of the complete device. Fig. 3 is a side elevation of the devices carried by the sound box in position to lift the stylus and carry the sound box to brake applying position. Fig. 4 is an end elevation of the sound box and the parts carried thereby showing the relative position of the stylus and the brush follower when the stylus is at the beginning of the groove zone. Fig. 5 is a side elevation of the parts carried by the sound box in the position they assume when the sound box is lifted to stylus exchanging position. Fig. 6 is a view partly in section and partly in elevation showing the means for retarding the movement of the tone arm at the termination of the groove zone. Fig. 7 is a detail view showing the bearing support for the latch device.

In the drawing the numeral 1 designates

the rotatable record support for the record disk 2.

At 3 is shown a brake device which includes the two brake shoes 4 and 5 which are preferably made of leather and adapted, in different positions of the tone arm 6 on which the brake device is mounted, to engage the periphery and stop the rotation of the record carrier 1. The brake device is clamped to the supporting arm by means of the band 7.

In the position indicated at *a* in Fig. 1 which is the position occupied by the arm when the sound box is removed from its position over the record for the purpose of changing records, the brake shoe 4 is brought into engagement with the record support. In the position shown at *c* in Fig. 1, which is the position the arm automatically takes when the stylus has reached the termination of the groove zone, the brake shoe 5 is brought into engagement with the record support. Thus it will be seen that in the two extreme positions to which the arm can be moved a brake is automatically applied to stop the rotation of the record support while at the position *b* the record carrier is free to begin its rotation.

A switch, indicated at 8 in Fig. 1, for controlling the circuit to the driving motor when the electric type of motor is employed which may be used in conjunction with the braking member 5. In the position of the tone arm indicated at *c* the member 3 would engage the end 9 of the switch arm to break the circuit controlled thereby. The switch contacts are placed beneath the top 10 of the motor casing while the member 9 of the switch projects outwardly through the slot 11 to a position in which 9 can be engaged by the brake device 3.

A lug 12 projecting upwardly from the plate 13 acts as a guide and stop for the brake device 3 when the brake member 4 is in engagement with the record carrier or turn table 1. In this position of the brake device the stop lug 12 engages the shoulder 14 to prevent excessive movement of the brake member 4.

Pivotally mounted in the end of the tone arm is the curved sound box supporting tube 15 carrying the sound box 16 and the stylus 17. Mounted on the sound box is the bracket 18 which forms a support for the devices which serve to lift the needle from the record and to carry the sound box to a non-playing brake-applying position.

Pivotally mounted on an extension 19 of the supporting bracket 18 is the arm 20 carrying at one end the buffer member 21 preferably made of soft rubber and the roller 22, and having the other end arranged to cooperate with a latch 23, pivoted in a bearing support 24 integral with the supporting bracket 18. The arm 20 if left free to move

will be rocked on its pivot by the weight of the buffer 21 and roller 22 which when released drops into engagement with the face of the record. Suitable stops 25 are provided on the extension 19 for coöperation with the arm 20 in either of its extreme positions.

Extending through a guide 26 and forming part of the latch 23 is a sliding rod 27 which is provided at its upper end with the weight 28 and carried at its lower end the brush, or non-playing, brush follower 29. The weight 28 is so disposed with relation to the pivotal point of the latch member as to tend to move the latch member to releasing position unless some means for restricting such movement is provided.

In order to prevent the movement of the latch to releasing position the brush 29 is employed. In the normal operation of the instrument the brush 29 engages with the grooves of the record and the frictional contact thus afforded is sufficient to prevent any lateral movement of the brush across the grooves thereby holding the latch member in latching position. To overcome any tendency which the brush might have to slide across the smooth outer margin of the record when the stylus is at the beginning of the groove zone, the brush has the record engaging end thereof arranged at an inclination or bevel with relation to the surface of the record as shown in Fig. 4. By this arrangement the extreme edge of the record disk will restrain any movement of the brush which might result in a premature release of the stopping mechanism.

In order to retard the movement of the tone arm and thereby prevent the stylus from continued movement toward the center of the disk after emerging from the last convolution of the groove, the weighted arm 30 is provided. This arm is pivoted on the supporting bracket 31 forming part of the braking device 3, and is adapted to be engaged by the fixed lug 13' on the plate 13 as the tone arm moves across the zone of grooves. It will be seen that the weight 32 when in contact with the lug 13' will exert a constant resistance against movement of the tone arm. The force of this resistance is less than the force exerted by the grooves on the stylus and consequently the stylus continues to be moved inwardly toward the center of the record until the final convolution of the groove zone has been reached. The pressure exerted by the weighted arm on the tone arm will now become apparent and the stylus will be restrained from further movement toward the center of the record, even if a slight tilting of the instrument should tend to cause such a movement. The force of the weight which tends to move the tone arm outwardly from the center of the record will now hold the stylus closely adjacent the

termination of the zone of grooves, or cause the stylus to drop back into the last convolution immediately after emerging therefrom at each rotation of the disk. When the stylus has reached this position the brush follower 29, which extends a considerable distance beyond the needle toward the periphery of the disk, is still in engagement with a number of grooves and consequently continues to be fed toward the center of the disk by the action of the grooves. It will be clear that, since the stylus is now stationary and the brush follower continues to move across the groove zone, the brush will move relatively to the sound box and the latch member 23 as a whole will be rocked about its pivot 24 and, aided by the action of the weight 28, will be tilted to a position in which the arm 20 will be released. The buffer 21 will now drop into engagement with the face of the record and will be immediately carried by the rotation of the disk to the position shown in Fig. 3 where the roller 22 engages the record and the arm 20 is in contact with one of the stops 25.

The movement of the buffer 21 with the record to bring the roller 22 into engagement therewith, has the effect of lifting the stylus from the record as shown in Fig. 3. The axis of the roller 22 is fixed at such an angle with relation to a radial line of the record disk drawn through the roller, that the continued rotation of the disk will carry the sound box toward the center of the disk to the position indicated at *c* in Fig. 1. In this position of the sound box the brake member 5 is brought into engagement with the periphery of the record disk support to stop the further rotation thereof.

In order to restore the position of the parts, the finger holds 33 and 34, which are provided for this purpose, are grasped to bring the sound box to the position indicated in Fig. 5. By this operation the weight of the buffer 21 and the roller 22 will bring the arm 20 to such a position that the end thereof will pass into place behind the latching member 23 when the finger hold 34 attached to the latch is released. The sound box is now in position to have the stylus removed and a fresh one substituted therefor. A movement of the tone arm from the position shown at *c* in Fig. 1 to that shown at *a* in Fig. 1 will remove the brake member 5 and bring the brake member 4 into engagement with the record carrier to hold the carrier stationary while a change of records is being made. Thus it will be seen that the braking device carried by the tone arm is effective in two non-playing positions to effect the stopping of the mechanism.

A spring 35 carried by the supporting arm 36 for the finger hold 33 is made use of when the finger holds are pressed together in the operation of swinging the sound box

down to playing position, to frictionally engage and hold the sliding rod 27 and the brush 29 carried thereby in elevated position while the stylus is being adjusted to position at the beginning of the zone of grooves. When the stylus has been put in place the release of the finger holds will allow the brush to drop to the position shown in Fig. 4 into engagement with the extreme edge of the disk from which position it will gradually creep across the smooth margin of the disk and into engagement with the grooves as the stylus begins its progressive movement across the groove zone. In this view the brush is shown as partly broken away.

What is claimed, is:

1. A sound reproducer stopping device comprising: a record disk having a zone of grooves, a swinging member, a sound box carried thereby, means carried by the sound box and movable into engagement with the record disk to carry the sound box to a position adjacent the center of the record disk when the stylus has reached the termination of the groove zone, controlling means for said carrying means engaging the groove zone and operable by the final convolutions thereof to allow the carrying means to move into engagement with said record disk, and stopping mechanism operated by said swinging member when the sound box is in such position.

2. A sound reproducer stopping device comprising: a record disk having a zone of grooves, a swinging member, a sound box carried thereby, means carried by the sound box and movable into engagement with the record disk to lift the stylus from the record disk at the termination of the groove zone and to carry the sound box to a position adjacent the center of the disk, controlling means for said carrying means engaging the groove zone and operable by the final convolutions thereof to allow the lifting and carrying means to move into engagement with said record disk, and stopping mechanism operated by said swinging member when the sound box is in such position.

3. A sound reproducer stopping device comprising: a record disk having a zone of grooves, a swinging member, a sound box carried thereby, means carried by the sound box and movable into engagement with the record disk to lift the stylus and to carry the sound box to a position adjacent the center of the record disk when the stylus has reached the termination of the groove zone, controlling means for said carrying means engaging the groove zone and operable by the final convolutions thereof to allow the lifting and carrying means to move into engagement with said record disk, and means carried by the swinging member for automatically stopping the mechanism when the sound box is in such position.

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4. A sound reproducer stopping device comprising: a record disk having a zone of grooves, a swinging member, a sound box carried thereby, means carried by the sound box and movable into engagement with the record disk to carry the stylus to a position adjacent the center of the record disk when the stylus has reached the termination of the groove zone, controlling means for said carrying means engaging the groove zone and operable by the final convolutions thereof to allow the lifting and carrying means to move into engagement with said record disk, and means carried by the swinging member for automatically engaging the record disk support to stop the rotation thereof when the sound box is in such position.

5. A sound reproducer stopping device comprising: a record disk having a zone of grooves, a swinging member, a sound box carried thereby, means carried by the sound box and movable into engagement with the record disk to lift the stylus and to carry the sound box to a position adjacent the center of the record disk when the stylus has reached the termination of the groove zone, controlling means for said carrying means engaging the groove zone and operable by the final convolutions thereof to allow the lifting and carrying means to move into engagement with said record disk, a switch, and means carried by the swinging member for opening said switch to stop the mechanism when the sound box is in such position.

6. A sound reproducer stopping device comprising: a record disk having a zone of grooves, a swinging member, a sound box carried thereby, means carried by the sound box and controlled by the record grooves for moving into engagement with the record disk to carry the sound box to a position adjacent the center of the record disk when the stylus has reached the termination of the groove zone, and stopping mechanism operated by said swinging member when the sound box is in such position.

7. A sound reproducer stopping device comprising: a record disk having a zone of grooves, a swinging member, a sound box carried thereby, means carried by the sound box and controlled by the record grooves for moving into engagement with the record disk to lift the stylus and to carry the sound box to a position adjacent the center of the record disk when the stylus has reached the termination of the groove zone, and means carried by the swinging member for automatically engaging the record disk support to stop the rotation thereof when the sound box is in such position.

8. A sound reproducer stopping device comprising: a record disk having a zone of grooves, a swinging member, a sound box carried thereby, a roller carried by the sound box and movable into engagement with the

record disk to lift the stylus and to carry the sound box to a position adjacent the center of the record disk when the stylus has reached the termination of the groove zone, controlling means for said lifting and carrying means engaging the groove zone and operable by the final convolutions thereof to allow the carrying means to move into engagement with said record disk, and means carried by the swinging member for automatically stopping the mechanism when the sound box is in such position.

9. A sound reproducer stopping device comprising: a record disk having a zone of grooves, a swinging member, a sound box carried thereby, a roller carried by the sound box and controlled by the record grooves for moving into engagement with the record disk to lift the stylus and to carry the sound box to a position adjacent the center of the record disk when the stylus has reached the termination of the groove zone, controlling means for said lifting and carrying means engaging the groove zone and operable by the final convolutions thereof to allow the carrying means to move into engagement with said record disk, and means carried by the swinging member for automatically stopping the mechanism when the sound box is in such position.

10. A sound reproducer stopping device comprising: a record disk having a zone of grooves, a swinging member, a sound box carried thereby, means carried by the sound box and movable into engagement with the record disk to lift the stylus and to carry the sound box to a position adjacent the center of the record disk when the stylus has reached the termination of the groove zone, means engaging said grooves for controlling said lifting and carrying means, stopping mechanism operated by said swinging member, and operable by the final convolutions thereof when the arm is in such position.

11. A sound reproducer stopping device comprising: a record disk having a zone of grooves, a swinging member, a sound box carried thereby, means carried by the sound box and engaging the record grooves for lifting the stylus and carrying the sound box to a position adjacent the center of the record disk when the stylus has reached the termination of the groove zone, means engaging said grooves and operable by the final convolutions thereof to control the lifting and carrying means, and stopping mechanism operated by said swinging member when the arm is in such position.

12. A sound reproducer stopping device comprising: a record disk having a zone of grooves, a swinging member, a sound box carried thereby, means carried by the sound box and movable into engagement with the record disk, for moving the swinging mem-

ber to a position in which the sound box is removed from the groove zone, stopping mechanism operated by the swinging member when the sound box is in such position, latching means for holding the moving means from operation, and means engaging the record grooves and operable by the final convolutions thereof for causing the latching means to release the moving means, said groove engaging means being composed of a plurality of parts individually incapable but collectively capable of actuating the latching means.

13. A sound reproducer stopping device comprising: a record disk having a zone of grooves, a swinging member, a sound box carried thereby, means carried by the sound box and constantly tending to move to a position in engagement with the record disk for moving the swinging member to a position in which the sound box is removed from the groove zone, stopping mechanism operated by the swinging member when the sound box is in such position, and means engaging the grooves of the record for holding said moving means against operation and operable by the final convolutions thereof to release the stopping means, said groove engaging means being composed of a plurality of parts individually incapable but collectively capable of holding the stopping means against operation.

14. A sound reproducer stopping device comprising: a record disk having a zone of grooves, a swinging member, a sound box carried thereby, means carried by the sound box and movable into engagement with the record disk for moving the swinging member to a position in which the sound box is removed from the groove zone, stopping mechanism operated by the swinging member when the sound box is in such position, means for controlling said moving means, and means composed of a plurality of bristles adapted to engage the grooves of the record and operable by the final convolutions thereof to actuate said controlling means, said bristles being individually incapable of performing their function but collectively capable of doing so.

15. A sound reproducer stopping device comprising: a record disk having a zone of grooves, a swinging member, a sound box carried thereby, means carried by the sound box and movable into engagement with the record disk to move the swinging member to a position in which the sound box is removed from the groove zone, stopping mechanism operated by the swinging member when the sound box is in such position, and a brush member mounted on the sound box and engaging the record grooves and operable by the final convolutions thereof for controlling said moving means, said brush engaging said record at an angle thereto

and with the bristles extending in the direction of rotation of said record.

16. A sound reproducer stopping device comprising: a record disk having a zone of grooves, a swinging member, a sound box carried thereby, means carried by the sound box and tending to move into engagement with the record disk to move the swinging member to a position in which the sound box is removed from the groove zone, stopping mechanism operated by the swinging member when the sound box is in such position, means carried by the sound box including a brush for holding said moving means inoperative by frictional engagement with the record grooves, said brush being operable by the final convolutions of the grooves to release the moving means for operation, the bristles of said brush increasing in length from the side nearest the center of the record to the other side whereby they will engage the edge of the record to hold the stopping means inoperative when the sound box is in a position at the outer margin of the groove zone.

17. A device of the character described comprising: a record disk having a zone of grooves, a swinging member, a sound box carried thereby, means carried by the sound box and movable into engagement with the record disk for moving the swinging member to a position in which the sound box is removed from the groove zone, stopping mechanism operated by the swinging member when the sound box is in such position, and means carried by the sound box including a brush movable with relation to the sound box for holding the moving means inoperative, said brush adapted to engage the grooves of the record and operable by the final convolutions thereof to actuate said moving means, and said brush having a beveled edge for contact with the record.

18. A record engaging member for a sound reproducer stopping device comprising: a swinging member, a sound box carried thereby, means carried by the sound box and movable into engagement with the record disk for moving the swinging member to a position in which the sound box is removed from the groove zone, stopping mechanism operated by the swinging member when the sound box is in such position, and means carried by the sound box including a guide, a brush slidably carried by the guide for holding the moving means, said brush adapted to engage the grooves of the record and operable by the final convolutions thereof to actuate said moving means, said brush having bristles which progressively increase in length from the edge of said brush nearest the center of the record disk to the edge of said brush most remote from said center.

19. In a sound reproducer, a swinging member, a stylus carried thereby, a record

having a zone of grooves, and means for impeding the movement of the swinging member to hold the stylus at the termination of the zone of grooves when the travel of the stylus through the zone has been completed.

20. In a sound reproducer, a swinging member, a stylus carried thereby, a record having a zone of grooves, and means for offering resistance to the movement of the swinging member, said means becoming effective when the stylus has reached the termination of the groove zone to prevent further movement of the swinging arm.

21. In a sound reproducer, a swinging member, a stylus carried thereby, a record having a zone of grooves, means for lifting the stylus out of engagement with the record, and means for impeding the movement of the swinging member to hold the stylus at the termination of the zone of grooves until the stylus lifting means has acted.

22. In a sound reproducer, a swinging member, a stylus carried thereby, a record having a zone of grooves, means for stopping the reproducer mechanism, and means for impeding the movement of the swinging member to hold the stylus at the termination of the zone of grooves until the stopping mechanism has begun to act.

23. In a sound reproducer, a swinging member, a stylus carried thereby, a record having a zone of grooves, means for lifting the stylus out of engagement with the record and for stopping the reproducer mechanism, and means for impeding the movement of the swinging member to hold the stylus at the termination of the groove zone until the lifting and stopping mechanism has begun to act.

24. A sound reproducer stopping device comprising: a record, a swinging member, stopping mechanism, means engaging the record grooves during the operation of the reproducer and movable with relation to the reproducer stylus to control the operation of the stopping mechanism, and means for impeding the movement of the swinging member to hold the stylus at the final groove while the controlling means is being moved relatively to the stylus to cause the operation of the stopping mechanism.

25. A sound reproducer stopping device comprising: a sound box, a record, a rotatable record support, mechanism for stopping the rotation of the record support, means carried by the sound box in engagement with the record grooves and movable with relation to the reproducer stylus to control the operation of the stopping mechanism and means for impeding the movement

of the swinging arm to hold the stylus in the final groove while the controlling means is being moved relatively to the stylus to cause the operation of the stopping mechanism.

26. A sound reproducer stopping device comprising: a swinging arm, a record, a rotatable record support, a device carried by the swinging arm for stopping the rotation of the record support, means for normally holding the stopping device inoperative, means carried by the swinging arm in engagement with the record grooves and movable with relation to the reproducer stylus to release the stopping device for operation, and means for impeding the movement of the swinging arm to hold the stylus adjacent the final groove while the controlling means is being moved relatively to the stylus to operate the stopping mechanism.

27. A sound reproducer stopping device comprising: a swinging arm, a sound box carried thereby, a record, a rotatable record support, a device operated by the swinging arm for stopping the rotation of the record support, means for engaging the rotating record to carry the swinging arm into position to operate the stopping device, means carried by the sound box in engagement with the record grooves and movable with relation to the reproducer stylus to control the operation of the carrying means, and means for resisting the movement of the swinging arm to hold the stylus from movement away from the termination of the groove zone while the controlling means is being moved relatively to the stylus to cause the operation of the stopping mechanism.

28. A sound reproducer stopping device comprising: a swinging arm, a sound box carried thereby, a record, a rotatable record support, a device carried by the swinging arm for lifting the stylus from the record and for stopping the rotation of the record support, means for normally holding the lifting and stopping means inoperative, means carried by the swinging arm in engagement with the record grooves and movable with relation to the reproducer stylus to release the lifting and stopping means for operation, and means for impeding the movement of the swinging arm to hold the stylus adjacent the final groove while the controlling means is being moved relatively to the stylus to operate the lifting and stopping mechanisms.

Signed at New York city, in the county of New York, and State of New York, this 25th day of January A. D. 1916.

MONTAGUE ADAIR.

ILLUMINATING DEVICE,
#1,189,592-----H. J. Lutz,
Patented-July 4th, 1916.
Filed November 4th, 1915.

H. J. LUTZ.
ILLUMINATING DEVICE.
APPLICATION FILED NOV. 4, 1915.

Patented July 4, 1916.

1,189,592.

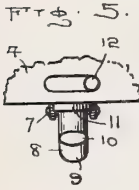
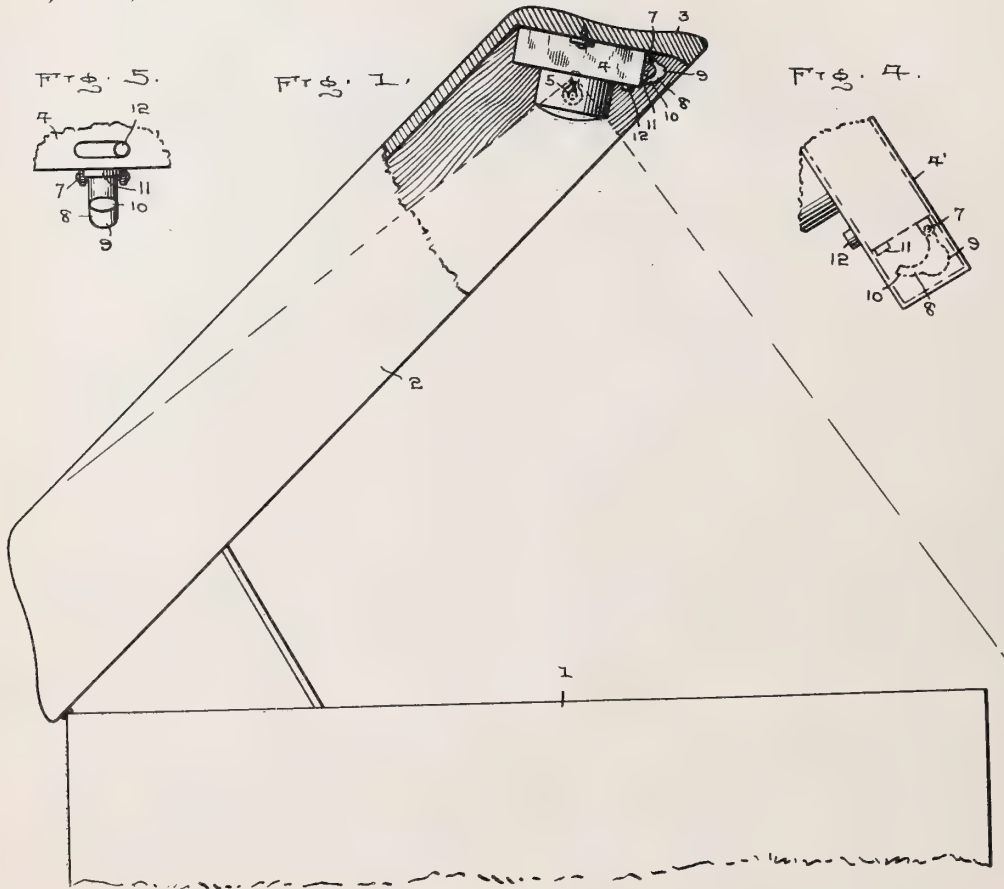


Fig. 1.

Fig. 7.

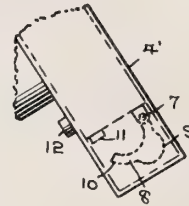
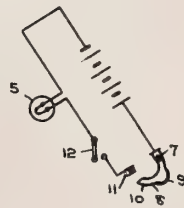
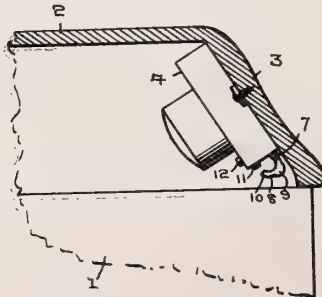
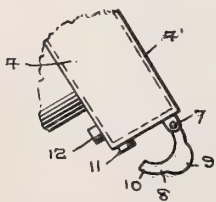


Fig. 2.

Fig. 6.

Fig. 3.



Witness
Thos. W. Riley

Inventor
H. J. Lutz

By *Carl P. Singleton*
Attorney

UNITED STATES PATENT OFFICE.

HARRY J. LUTZ, OF WHEELING, WEST VIRGINIA.

ILLUMINATING DEVICE.

1,189,592.

Specification of Letters Patent.

Patented July 4, 1916.

Application filed November 4, 1915. Serial No. 59,576.

To all whom it may concern:

Be it known that I, HARRY J. LUTZ, a citizen of the United States, residing at Wheeling, in the county of Ohio and State of West Virginia, have invented certain new and useful Improvements in Illuminating Devices, of which the following is a specification.

My invention consists in a new and useful improvement in illuminating devices for use in receptacles, adapted to illuminate the interior of the receptacle, automatically, when the latter is opened. While the device is applicable to receptacles of various kinds, it is especially adapted for the illumination of the interior of cabinets containing graphophone mechanism.

The invention is fully illustrated in the details of construction hereinafter pointed out.

In the drawings: Figure 1 is an end view of the device applied to a receptacle, the top of which is opened and indicated partly in section, showing the parts in position to illuminate the interior of the receptacle. Fig. 2 is a similar view of the device, the top closed and indicated partly in section, showing the parts in normal position. Fig. 3 is a detail end view of the contact device, showing the parts in the positions assumed when the cover is closed. Fig. 4 is a similar view indicating a modified form of cover for the battery container. Fig. 5 is a bottom view of a portion of the end indicated in Fig. 3. Fig. 6 is a diagrammatic view of the circuit.

In the drawings, a box, cabinet or receptacle of like nature, 1, is provided with a pivoted cover 2 having the outer end 3 to which is affixed a battery container 4 having the cover 4' and provided with a lamp 5 and a contact device, composed of a pivotal bearing 7, a pendant arm 8 pivoted therein and provided with an enlarged weighted portion 9 extending from one side of its diameter and a contact finger 10 extending from the other side, and a contact plate 11 so placed as to be in the path of the contact finger 10.

As indicated in Fig. 6, the electric circuit is arranged through the battery, lamp and contact device. Within the circuit there is placed a manually operated circuit breaker 12.

The illuminating device operates substan-

tially as follows: The parts being in the position indicated in Fig. 2, the circuit breaker 12 being closed, when the cover 2 is moved into the position indicated in Fig. 1 the end portion 3 changes the position of the battery container 4 so that the pendant arm 8 moves in the pivot bearing 7, bringing the finger 10 into contact with the plate 11, thus closing the circuit and lighting the lamp 5. If it is desired to break the circuit without changing the position of the cover 2, this may be done by the operation of the circuit breaker 12.

In Fig. 4 is shown a modification in the form of the cover 4' of the battery container 4 in which the contact device is inclosed within the cover 4'.

Having described my invention, what I claim is:

1. An illuminating device, consisting of an electric battery, an electric lamp, and, interposed within the circuit connecting them, a contact device, movably mounted, and comprising a pivot bearing provided with a pendant arm having a contact finger adapted to swing into contact with a contact plate to close the circuit, by gravity, when the contact device is moved.

2. An illuminating device, consisting of an electric battery, an electric lamp and, interposed within the circuit connecting them, a contact device attached to the pivoted cover of a receptacle and provided with a movable gravity-actuated member, rendered operative solely by the movement of the pivoted cover, to close the circuit, by gravity, when the pivoted cover is swung to a position opening the receptacle, and open the circuit, by gravity, when the pivoted cover is swung to a position closing the receptacle.

3. The combination of a receptacle provided with a pivoted cover, a source of electrical energy, a device operated by electrical energy and a contact device, mounted upon the pivoted cover, and provided with means operated by gravity and operating solely by the movement of the pivoted cover, for electrically connecting the source of electrical energy and the device operated by electrical energy.

4. The combination of a receptacle provided with a pivoted cover, a source of electrical energy, a device operated by electrical energy, and a contact device, carried by

the pivoted cover, and provided with a movable gravity-actuated member, operating solely by the movement of the pivoted cover.

5 5. The combination of a receptacle provided with a pivoted cover, a source of electrical energy, a device operated by electrical energy, and a contact device, carried by the pivoted cover, and comprising a pivot bearing provided with a pendant arm having a contact finger adapted to engage with a contact plate, by gravity, when the pivoted

cover is swung to a position opening the receptacle, and adapted to swing out of engagement, by gravity, when the pivoted cover is returned to a position closing the 15 receptacle.

In testimony whereof, I affix my signature in presence of two witnesses.

HARRY J. LUTZ.

Witnesses:

THOS. S. HOPKINS,

CAESAR A. CARBALLO.

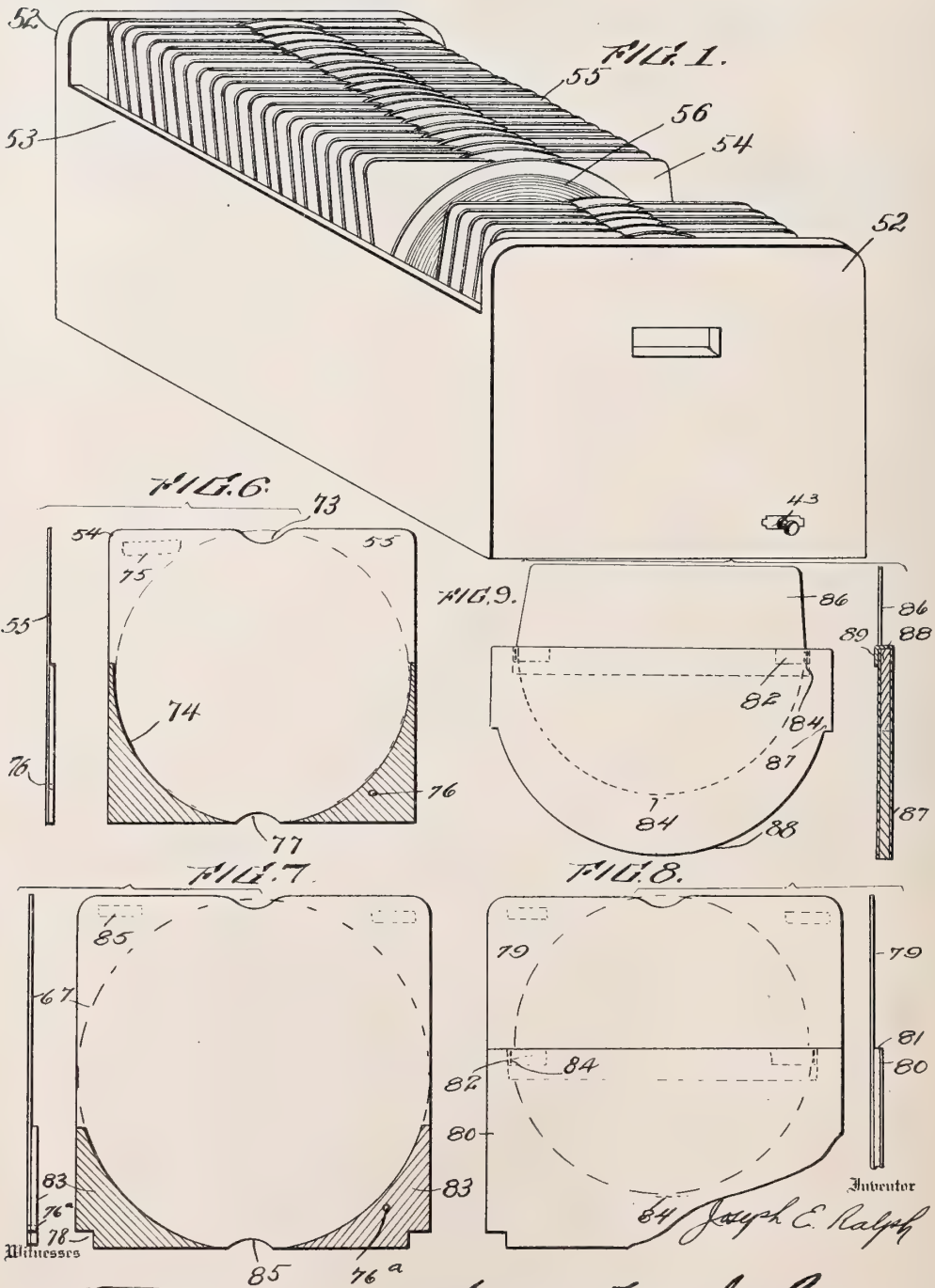
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

FILING DEVICE FOR DISK RECORDS,
#1,190,005-----J. E. Ralph,
Patented-July 4th, 1916.
Filed-May 11th, 1914.

J. E. RALPH.
 FILING DEVICE FOR DISK RECORDS.
 APPLICATION FILED MAY 11, 1914.

1,190,005.

Patented July 4, 1916.
 2 SHEETS—SHEET 1.



Witnesses
R. A. Troegner
W. H. Wakefield

Inventor
J. E. Ralph
Mason Fenwick Lawrence
 Attorneys

J. E. RALPH.
 FILING DEVICE FOR DISK RECORDS.
 APPLICATION FILED MAY 11, 1914.

1,190,005.

Patented July 4, 1916.

2 SHEETS—SHEET 2.

FIG. 2.

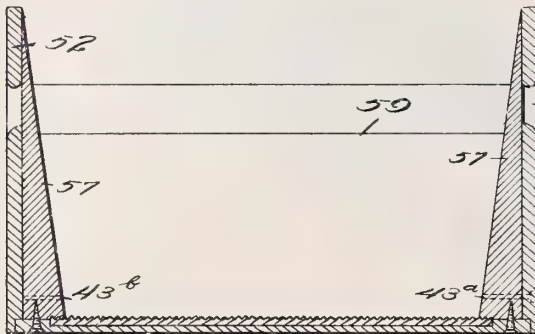


FIG. 3.

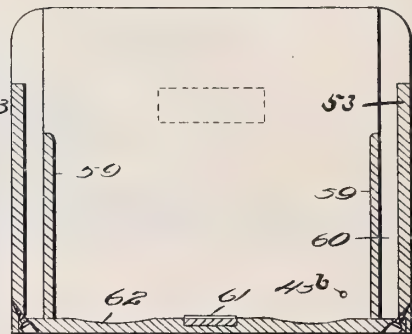


FIG. 4.

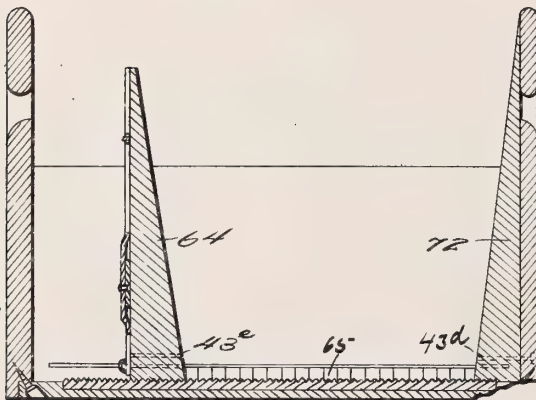


FIG. 5.

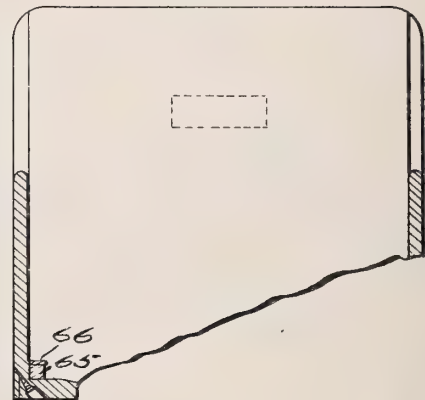
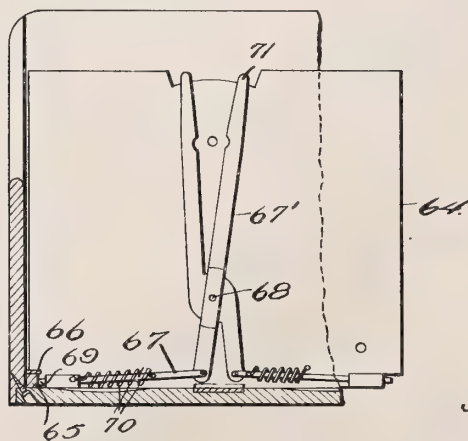


FIG. 10.



Inventor
 Joseph E. Ralph.

By *Mason Fennick Lawrence,*
 Attorneys

UNITED STATES PATENT OFFICE.

JOSEPH E. RALPH, OF NEWARK, NEW JERSEY.

FILING DEVICE FOR DISK RECORDS.

1,190,005.

Specification of Letters Patent.

Patented July 4, 1916.

Application filed May 11, 1914. Serial No. 837,858.

To all whom it may concern:

Be it known that I, JOSEPH E. RALPH, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Filing Devices for Disk Records; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in filing devices for disk records of talking machines and one object is to take advantage of the fact that of the two sizes of records in general use the smaller ones greatly preponderate, and to so vary the dimensions of the filing trays that the one arranged solely for small records will also provide spaces for catalogues without interfering with its interchangeability.

A further object is to provide novel means for partitioning and indexing the inner trays in order that a special space may be provided for each contained record according to its size, with an appropriate index, and means to rearrange the various partitions in harmony with an index system, as conditions vary by the accumulation or disposal of records.

With these and other objects in view, the invention consists of the novel combination, construction and arrangement of parts as will be hereinafter more fully described and claimed.

In the accompanying drawings wherein similar reference characters designate corresponding parts throughout the several views: Figure 1 is a perspective view of the tray showing records filed therein; Fig. 2 is a vertical longitudinal section through the tray; Fig. 3 is a vertical transverse section of the box seen in Fig. 2; Fig. 4 is a longitudinal central section of a modified form of box adapted to hold other records than those held by the form shown in Fig. 2; Fig. 5 is a transverse vertical section of the modification seen in Fig. 4; Fig. 6 shows a partition card such as may be used for separating the disks; Fig. 7 shows a similar partition card of modified form; Fig. 8 shows a still further modification of partition card with a disk holder; Fig. 9 shows a device to adapt a partition in a tray for large records to accommodate a smaller rec-

ord; Fig. 10 is a view including the following block shown in Fig. 4, the block carrying a retaining device.

I will first describe the tray for the matter to be filed, reference being made to Fig. 1, where it will be seen that the ends 52 extend above the sides 53 so as to leave exposed the corners 54 of partition cards 55 which may be interposed between the disks 56. An approved form of partition card may be used and I shall describe several forms herein, but it is desirable whatever form is used that sufficient space be allowed at the corners 54 for the printing thereon of the titles of the selections of the records at an indicated location 75. Where double records are employed, both the upper corners of the parting cards will bear the names of the selections of the disk corresponding thereto.

Referring to Fig. 2 it will be seen that the ends 52 are provided with blocks 57 having their inner faces inclined, these blocks being of less width than the width of the tray as seen in Fig. 3. Any suitable means may be employed for securing the blocks to the tray such as glue and in order that the partitions and adjusters, Figs. 6 to 9, which contain the disks may be held in the center of the tray, there are provided partitions 59 which extend the full length of the tray and form with the blocks 57 a space within which the records may be placed. Any means may be employed for securing the plates 59 in place. It will be noted that between the plates 59 and the sides 53 of the container there are defined spaces 60 within which may be placed catalogues or other articles which will make the operation of the talking machine more convenient. Near the lower right-hand corner of the tray, Fig. 1, will be seen the end of a conventional locking rod 43 and the Figs. 6 and 7 the receiving orifices 76 and 76^a.

Referring to Fig. 3, it will be seen that there is centrally located with respect to the tray and in the bottom thereof a strip of corrugated rubber 61 having the surface corrugated crosswise as shown in Fig. 2 and held in place by having the ends thereof bound by the blocks 57, although any other scheme of securing the rubber padding 61 may be employed. The purpose of the cushion 61 is to prevent the jarring which is almost sure to ensue upon the placing of a record within the tray and to resist the tend-

ency of the records to slip when inclined. If desired, the bottom of the tray may be concave as at 62 upon each side of the cushion 61. In order that the tray may be raised from the cabinet in which it is intended to be used, there are provided hand holds in the end walls 63 formed as seen in Fig. 2.

By referring to Fig. 4, there will be seen a modified form of tray which is like the tray shown in Fig. 2 in most respects, but differs in that it has one of the blocks 64 movable and provided with means for holding the same in any adjusted position. As seen in Fig. 5, the bottom of the tray shown in Fig. 4 has a ratchet 65, the upper surface of which is provided with a plate 66 which may overhang the ratchet 65 slightly. Fig. 10 shows a spring catch which can be used for engaging the ratchet 65 so as to hold the block 64 in any adjusted position, this catch comprising a rod 67 pivoted as at 68 to the block and having the lower end thereof provided with a tooth 69 which may be normally pushed outwardly by means of a spring 70, the upper end of the rod being provided with a finger clip 71. When the clip 71 is pulled outwardly, of course, the tooth 69 would be drawn away from the ratchet 65 and it will be possible to move the block back away from the corresponding inclined block 72. It is understood, of course, that when the block 64 is to be moved toward the block 72, there will be no need for operating the finger clip 71 as the tooth 69 will slide over the ratchet 65. The tray as shown in Fig. 5 is not provided with partitions such as are shown at 59 in Fig. 3 and the reason for this is that the modified form of container is to be used with larger sized disks, while the preferred form as seen in Fig. 3 is to be used with smaller sized disks in so far as this description goes. Apertures 43^a, 43^b, 43^a and 43^e, may be provided for the accommodation of a locking rod. These openings are made in blocks 57 and in the front of the tray.

In Fig. 6 I have shown the form of partition card designed for use in the tray shown in perspective in Fig. 1 adapted to contain records of one size only. The partition card itself 55 may be cut from wood, thin metal or card, of the quality known as manila tag board, and having its upper corners rounded as at 54. To give ready access to records, the top is centrally notched at 73 and may also be similarly notched centrally on the bottom edge as at 77. To space the partition cards properly, pads 74, cut from material of approximately the same thickness as the records to be filed, are secured by glue or other suitable means at the two lower corners of the card 55. To effect the indexing, the titles of the records may be printed or written on the upper corners at 75 of the appropriate partition. The orifice 76 through the right-hand pad is for a con-

ventional locking rod which, however, may be omitted without seriously interfering with the use of the apparatus. It will be noted that the adjacent ends of the pads 74 are spaced to leave an opening 77 through which the disk may extend. The opening 77 is so positioned as to allow the disk when extended to contact with the cushion 61 and the corrugations formed on the cushion 61 will serve to space the disks and prevent sliding of the same longitudinally with respect to the container.

Fig. 7 shows a modified form of the invention wherein the partition and pads are notched as at 78 for use within a tray with sliding block and ratchets as shown in Figs. 4 and 5 otherwise 67 is identical with partition 55 in Fig. 6 having pads 83, title spaces 85 and locking rod orifice 76^a similar and for the same purposes, as the spaces and rod orifices already described.

As the tray, Figs. 4 and 5, for descriptive purposes arranged to receive records of several sizes some special forms of partitions and devices adapted to support the records of lesser diameter and maintain them in alinement are shown in Figs. 8 and 9 of the same type as shown in Figs. 7, but they would be made with full lower corners as 55 in Fig. 6 for use in the preferred tray shown in Figs. 2 and 3.

In Fig. 8 is shown the modification of the partition card of Fig. 7 necessary to adapt it to receive and index a record of lesser diameter. The card 79 is identical in form as 67 shown in Fig. 7 having the round corners, central notch and title indications on its upper edge and the notched lower corners the only omission being the central notch on the lower edge as not needed. The pad 81 to receive the record is of the same thickness as the pads in Fig. 7, but extends entirely across the bottom of 79 and has an arcuate excision on its upper edge the lowest point of which is at such a distance from the lower edge of the pad that a superimposed record will have its upper edge in alinement with larger records in connection with partitions of the type in Fig. 7. To maintain a contained record in its proper relation to the partition 79 a tough paper face 80 is secured by glue or other means across the entire pad 81 and its arcuate excision, and to prevent tearing at the ends of the opening between 79 and 80 reinforcements of textile fabric 82 are inserted between the folded upper edge of face cover 80, the ends of which extend backward and under the upper ends of pad 81 where they are still further secured by wire staples 84 or other means that also pass through and secure card 79, pad 81 and face 80 together. A similar staple 84 is also placed below the bottom of the arcuate excision. There may also be an orifice similar to 76^a for the pas-

sage of a locking rod, and locations for titles are indicated. In practice a tray for one size would be filled with properly padded partitions according to its size and the records placed relative to their titles and if a change became necessary to conform to the index system it would be arranged by withdrawing the locking rod and rearranging the partitions. A tray adapted to receive two sizes of records would be fitted with an assorted complement of partitions, see Figs. 7 and 8 and the changes due to size would be as convenient to arrange as for titles.

To adapt a partition for a large record to use with a small record a supplementary device shown in Fig. 9 is provided which is an adaptation of the device for very similar purposes shown in my application for filing envelopes bearing Serial Number 799,052 which has a pad 88 of proper thickness to represent a small record the bottom edge of which is cut on the same curve as the circumference of a large record, the sides parallel and of the same width as a partition and provided on top edge with an arcuate excision suited to receive a small record. On the back of the pad is secured a tough paper cover 86 following its contour on sides and bottom but extending above, but not enough to cover the titles and top notch of a partition to which it is applied. A similar tough paper 87 is secured to the face of the pad that has its upper edge folded down with textile reinforcements 82 within and further secured by staples or equivalents 84 exactly like face cover 80 in Fig. 8 but in addition the upper corners of face cover 87 are turned over the upper ends of pad 88 and secured behind as at 89 with glue or other suitable means.

I claim:

1. A container for filed matter comprising a box structure having sides and ends, and a corrugated strip of cushioning material held centrally with respect to the bottom of the container, the sides of the container adapted to hold the filed matter so that the lowest portion thereof will engage the cushioning member.

2. A container for filed matter comprising a box structure having ends and sides, plates parallel to the sides but spaced therefrom and a cushioning member located centrally with respect to said plates, the upper surface of the cushioning member being roughened, the plates adapted to hold the filed matter in such position that the lowest portion thereof will engage the cushioning member.

3. A device for holding disk records com-

prising a partition strip, padding strips secured to one side thereof adjacent the bottom thereof, the upper surfaces of the padding strips being arcuate to conform to the shape of a disk record, a space being defined between adjacent portions of the padding strips through which the bottom of the disk record may extend to engage the bottom of a suitable container.

4. A device for holding disk records comprising a partition strip, padding strips located adjacent the bottom thereof and having the upper edges arcuate, adjacent portions of the padding strips being spaced to define an opening, a container for carrying a record having the bottom thereof arcuate and adapted to conform to the arcuate edges of the padding strips, the bottom of the container adapted to extend into the opening to engage the bottom of a suitable container, said first mentioned container adapted to receive a disk record.

5. A device for holding disk records comprising a partition strip, padding strips located adjacent to the bottom of the partition strip and spaced apart to form an opening therebetween, the upper edges of the padding strips being of concave formation for receiving the rounded portion of a disk record, and means for securing the padding strips to the partition strip.

6. A device for holding disk records comprising a partition strip and carrying an index device, padding strips located adjacent to the bottom of the partition strip, said padding strips having their upper edges concave in formation for the purpose of receiving the rounded portion of a disk, and an envelop for carrying a disk record adapted for insertion into said holding device.

7. A device for holding disk records comprising a partition strip, a padding strip secured to one side thereof, the upper edge of the padding strip being concave, a sheet extending across the padding strip on the side opposite the partition strip, and reinforcing devices connecting the said sheet with the upper portions of the padding strip.

8. A device for holding disk records comprising a partition strip, padding material located adjacent to the bottom thereof and having its upper edge concave in formation, an envelop for carrying a record and having a portion of its edge convex in formation, said envelop being adapted to receive a disk record and to be received by the concave portion of the padding material.

In testimony whereof I affix my signature.

JOSEPH E. RALPH.



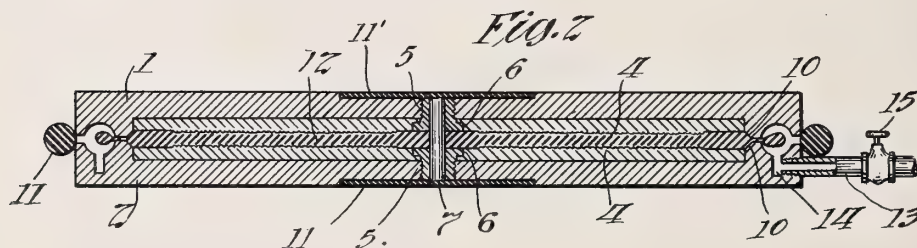
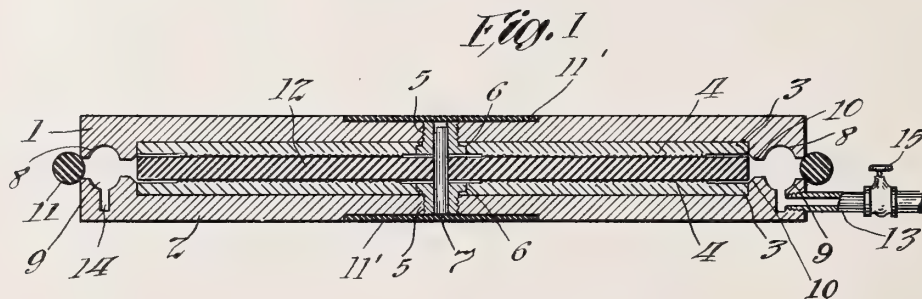
PROCESS AND APPARATUS FOR
MOLDING,

#1,190,072-----E. L. Aiken,
Patented-July 4th, 1916.
Filed-October 18th, 1912.

E. L. AIKEN.
PROCESS AND APPARATUS FOR MOLDING.
APPLICATION FILED OCT. 18, 1912.

1,190,072.

Patented July 4, 1916.



Witnesses:

Frederick Bachmann.

Inventor:

Edward L. Aiken
by Frank C. Aiken
his Atty.

UNITED STATES PATENT OFFICE.

EDWARD L. AIKEN, OF ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PROCESS AND APPARATUS FOR MOLDING.

1,190,072.

Specification of Letters Patent.

Patented July 4, 1916.

Application filed October 18, 1912. Serial No. 726,425.

To all whom it may concern:

Be it known that I, EDWARD L. AIKEN, a citizen of the United States and a resident of Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Processes and Apparatus for Molding, of which the following is a description.

My invention relates to processes and apparatus for molding, especially to those for use in connection with the pressing of disk sound records from a mass of plastic record material.

The principal objects of my invention are to facilitate the making of a true and faithful sound record or other similar molded object and to provide other improvements as will hereinafter appear.

In the molding of objects by the pressing of a mass of plastic composition, such as a plastic sound record blank, against the face or mold surface of a mold, the accuracy of the impression in the molded object is frequently impaired by reason of the entrapping of air between the composition and the mold when the former is pressed into the latter. This defect is especially marked when the object to be molded is a sound record; as the record surface of the mold or matrix is filled with small elevations corresponding in negative to the record undulations, between which elevations the air is entrapped to such an extent as to render the resultant record very imperfect. My invention contemplates the elimination of this objection by the exhaustion of the air from between the mold surface or surfaces and the plastic composition prior to the pressing operation, the vacuum thus obtained being maintained until the composition has been pressed or formed into shape.

In order that my invention may be more clearly understood, attention is hereby directed to the accompanying drawing forming a part of the specification and in which—

Figure 1 is a central vertical sectional view showing one form of my improved apparatus prior to the application of pressure in the molding operation; and Fig. 2 is a similar view showing the same apparatus after the application of pressure in the molding operation.

In both of the views, like parts are designated by the same reference numerals.

The apparatus shown comprises superposed flat mold plates 1 and 2, each having a central depressed portion 3 in which is secured a sound record matrix 4, each matrix as shown being provided with the usual reverse or negative of the sound record undulations. The matrices are secured in position in their respective mold plates by annular bushings 5 threaded into the mold plates and provided with headed portions 6 bearing upon the matrices 4 and seated in recesses in the latter. A centering pin 7 mounted in the lower bushing 5 and preferably secured therein, as by friction, is adapted to be passed into the central opening in the other bushing so as to hold the mold plates in alinement. The mold herein shown is what is termed a "flash mold", that is, a mold in which the excess material is forced out between the mold surfaces of the opposing mold plates, as shown in Fig. 2, when these plates are brought together in pressing the plastic composition into shape. In the mold shown, this excess material is forced into the hollow space between annular recesses 8 and 9 formed in the mold plates 1 and 2 respectively a slight distance beyond the periphery of the matrices 4 and concentrically with the latter, the portions of the opposing mold plates between the recesses 8 and 9 and the matrices 4 being so shaped as to leave the said recesses in communication with the space between the matrices during the pressing operation. The mold plates are preferably provided with inclined surfaces 10, 10 for forming the periphery of the record during the pressing operation, these surfaces 10 being so inclined that the finished record has its largest diameter midway between its flat or record bearing surfaces.

In order to render the mold air tight so as to permit of the production of a vacuum therein, I provide a ring 11 of rubber or other suitable yielding material of such a size that the same is adapted to fit closely against the peripheral portions of the mold plates 1 and 2 to close or seal the space between said plates, as clearly shown in Figs. 1 and 2. Disks 11' of rubber or other suitable yielding material may be placed in

recesses in the outer faces of the plates 1 and 2 and over the ends of the pin 7 and the outer ends of the bushings 5 to prevent the entrance of air around the end portions of the said pin to the space between the mold plates. It will be seen that by reason of the yielding character of the ring 11, the mold plates may be moved toward each other from the position shown in Fig. 1 a sufficient amount to permit the molding of the record without disturbing the vacuum between the said plates. To permit the ready extraction of the air from the space between the mold plates, I provide a hollow tubular connection 13 threaded into the lower mold plate 2 and communicating at its inner end with an annular slot 14 which in turn communicates with the bottom of the recess 9. The outer end of the connection 13 is adapted to be connected with a suction pump or any other suitable air exhausting means whereby, after the mold plates and the ring 11 are in the positions indicated in the drawing, air may be exhausted from the mold through the space between the recesses 8 and 9 and the connection 13. A valve 15 is preferably provided in the connection 13 so as to permit the closing of the said connection to maintain the vacuum in the mold after the air has been exhausted from the latter.

In using the apparatus described above, the matrices 4, 4 are first secured in position by the bushings 5, after which the plastic composition, such as the disk record blank or tablet 12 shown, and the upper mold plate are placed in position on the centering pin 7 with the matrices in contact with the faces of the blank or tablet. The ring 11 is then placed in position around the mold plates to close or seal the space between the same, as shown, after which the valve 15 is opened and the air is withdrawn from the mold. While theoretically best results would be obtained by the production of a complete vacuum, I find that very satisfactory results are obtained by a vacuum of 25" to 27" of mercury.

The term "vacuum" in the appended claims is used in a general sense and is intended to cover any suitable partial vacuum.

A vacuum having thus been produced in the mold, the valve 15 is closed and the mold plates are forced toward each other in a suitable press, the composition of the blank 12 being first rendered sufficiently plastic, as by the application of heat. Of course, the valve 15 may, if desired, be kept open and the suction kept up during the pressing operation. During the latter operation, the surplus composition will be forced into the recesses 8 and 9 and the record will be molded to substantially correct form, the record undulations being faithfully reproduced in the finished record. All that remains to be done is to permit the molded

record to become hardened, as by cooling in the atmosphere, after which air may be admitted between the mold plates, and the ring 11 and the finished record removed.

While I have described my invention in connection with the molding of disk sound records in which the record impression is formed in both of the faces of the record, it is evidently applicable as well to the molding of records in which the sound record impressions are formed in only one face of the record and also to many other types of molded articles.

Many other changes may be made in the invention as specifically described above and I do not, therefore, limit myself to the exact details shown.

What I claim as new and desire to protect by Letters Patent of the United States is as follows:

1. The process of molding tablets which comprises placing moldable material between two mold plates, sealing the space between said plates to render the same air tight, withdrawing air from between said plates peripherally of said material and producing a vacuum in said space, rendering said material plastic, and pressing the same to shape between said plates while maintaining said vacuum, substantially as set forth.

2. The process of molding disk records which comprises placing moldable material between two mold plates, one of which contains a mold surface having a negative or reverse copy of record undulations therein, sealing the space between said plates to render the same air tight, withdrawing air from between said mold surface and said material peripherally of said material and producing a vacuum in said space, rendering said material plastic, and pressing the same to shape between said plates while maintaining said vacuum, substantially as set forth.

3. The process of molding disk records which comprises placing moldable material between two mold plates, each having a mold surface containing a negative or reverse copy of record undulations, sealing the space between said plates to render the same air tight, withdrawing air from between said mold surfaces and said material peripherally of said material and producing a vacuum in said space, rendering said material plastic, and pressing the same to shape between said plates while maintaining said vacuum, substantially as set forth.

4. The process of molding tablets which comprises placing moldable material between two mold plates, sealing the space between said plates with a ring of yielding material to render the same air tight, withdrawing air from between said plates peripherally of said material and producing a vacuum in said space, rendering said ma-

terial plastic and pressing the same to shape between said plates while maintaining said vacuum, substantially as set forth.

5 The process of molding disk records which comprises placing moldable material between two plates, one of which contains a mold surface having a negative or reverse copy of record undulations therein, sealing the space between said plates with a ring of yielding material to render the same air tight, withdrawing air from between said mold surface and said material peripherally of said material and producing a vacuum in said space, rendering said material plastic, 10 and pressing the same to shape between said plates while maintaining said vacuum, substantially as set forth.

6. The process of molding disk records which comprises placing moldable material between two mold plates, each having a mold surface containing a negative or reverse copy of record undulations, sealing the space between said plates with a ring of yielding material to render the same air 25 tight, withdrawing air from between said mold surfaces and said material peripherally of said material and producing a vacuum in said space, rendering said material plastic, and pressing the same to shape between said 30 plates while maintaining said vacuum, substantially as set forth.

7. In apparatus of the class described, the combination of a plurality of superposed mold plates, means for sealing the space between the same to prevent the entrance of air to said space, and means whereby air may be exhausted from said space, substantially as described.

8. In apparatus of the class described, the combination of a plurality of superposed mold plates, a ring of yielding material surrounding said plates for sealing the space between the same to prevent the entrance of air to said space, and means whereby air 40 may be exhausted from said space, substantially as described.

9. In apparatus of the class described, the combination of a plurality of superposed mold plates, means for sealing the space between the same to prevent the entrance of air to said space, and a hollow connection communicating with said space whereby air may be exhausted from the latter, substantially as described.

55 10. In apparatus of the class described, the combination of a plurality of superposed mold plates, a ring of yielding material surrounding said plates for sealing the space between the same to prevent the entrance of air to said space, and a hollow connection communicating with said space 60

whereby air may be exhausted from the latter, substantially as described.

11. In apparatus of the class described, the combination of a plurality of superposed 65 mold plates, means for sealing the space between the same to prevent the entrance of air to said space, a hollow connection communicating with said space whereby air may be exhausted from the latter, and a valve in 70 said connection for opening or closing the same, substantially as described.

12. In apparatus of the class described, the combination of a plurality of superposed mold plates, one of said plates having a 75 central molding portion and an annular recess surrounding said molding portion, means for sealing the space between said plates to prevent the entrance of air to said space, and means communicating with said 80 recess whereby air may be exhausted from the space between said plates, substantially as described.

13. In apparatus of the class described, the combination of a plurality of superposed 85 mold plates each having a central molding portion and an annular recess surrounding said molding portion and communicating with the space between said molding portions, and means for sealing the space between 90 said plates to prevent the entrance of air to said last named space, one of said plates having means communicating with said recesses whereby air may be exhausted from the space between said plates, substan- 95 tially as described.

14. As a new article of manufacture, a mold plate having an inner molding portion, a recess surrounding said molding portion, and a hollow connection leading from 100 said recess, substantially as described.

15. As a new article of manufacture, a mold plate having an inner molding portion, a recess surrounding said molding portion, a hollow connection leading from said re- 105 cess, and a valve for closing said connection, substantially as described.

16. In apparatus of the class described, the combination of a plurality of superposed mold plates, one of said plates having a central opening therein, means for sealing the 110 space between said plates to prevent the entrance of air into said space, means for sealing said opening, and means whereby air may be exhausted from said space, substan- 115 tially as described.

This specification signed and witnessed this 11th day of October, 1912.

EDWARD L. AIKEN.

Witnesses:

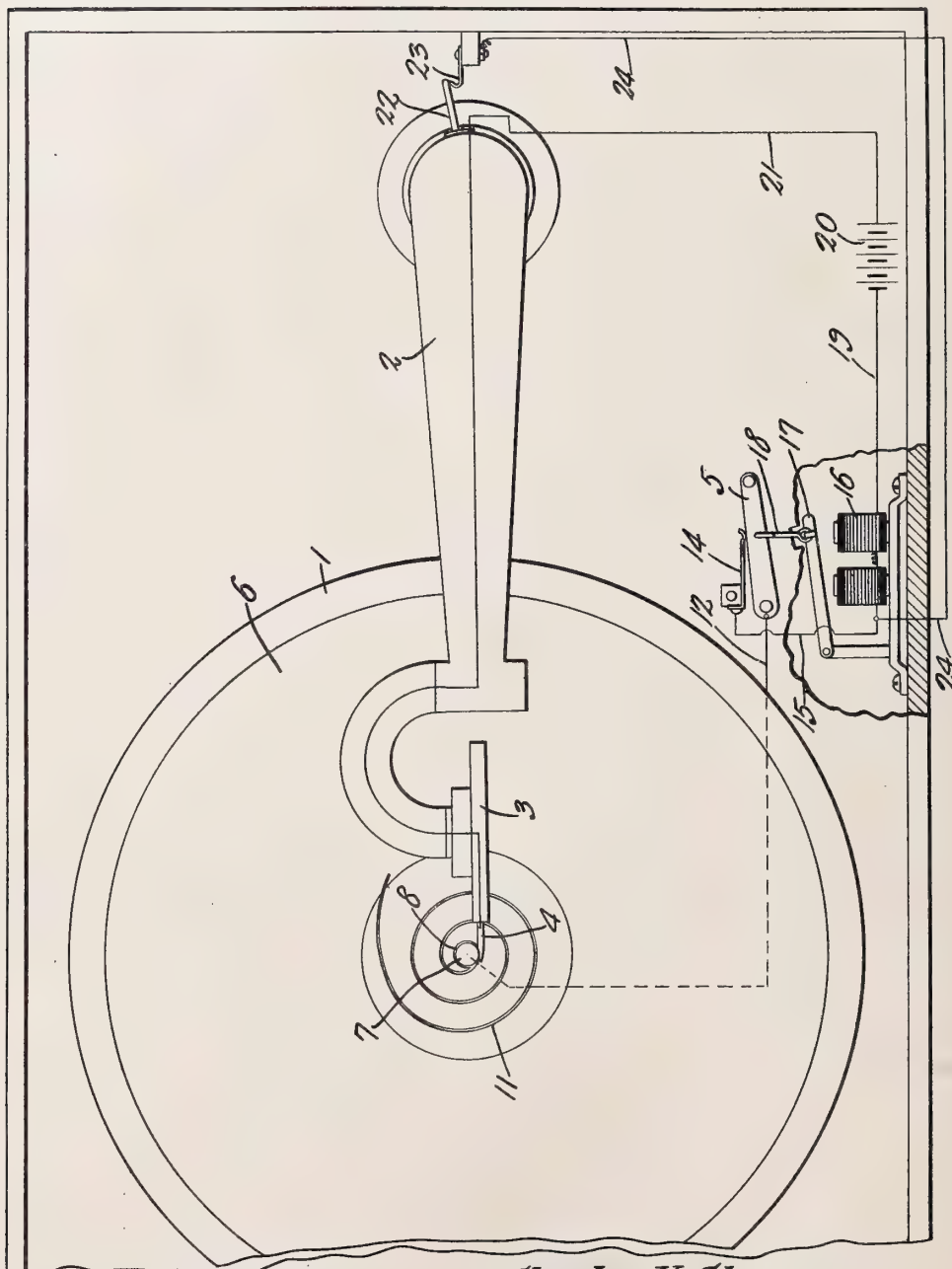
FREDERICK BACHMANN,
MARY J. LAIDLAW.

ARRESTER FOR SOUND PRODUCING APPARATUS.
 #1,190,112-----C.Y. Clawson,
 Patented-July 4th, 1916.
 Filed-April 27th, 1915.

C. Y. CLAWSON.
ARRESTER FOR SOUND PRODUCING APPARATUS.
APPLICATION FILED APR. 27, 1915.

1,190,112.

Patented July 4, 1916.
2 SHEETS—SHEET 1.



Witnesses

J. P. Luntin
Monroe E. Miller

Fig. 1.

Chester Y. Clawson Inventor

by *C. A. Snow & Co.*
Attorneys

C. Y. CLAWSON.
ARRESTER FOR SOUND PRODUCING APPARATUS.
APPLICATION FILED APR. 27, 1915.

1,190,112.

Patented July 4, 1916.

2 SHEETS—SHEET 2.

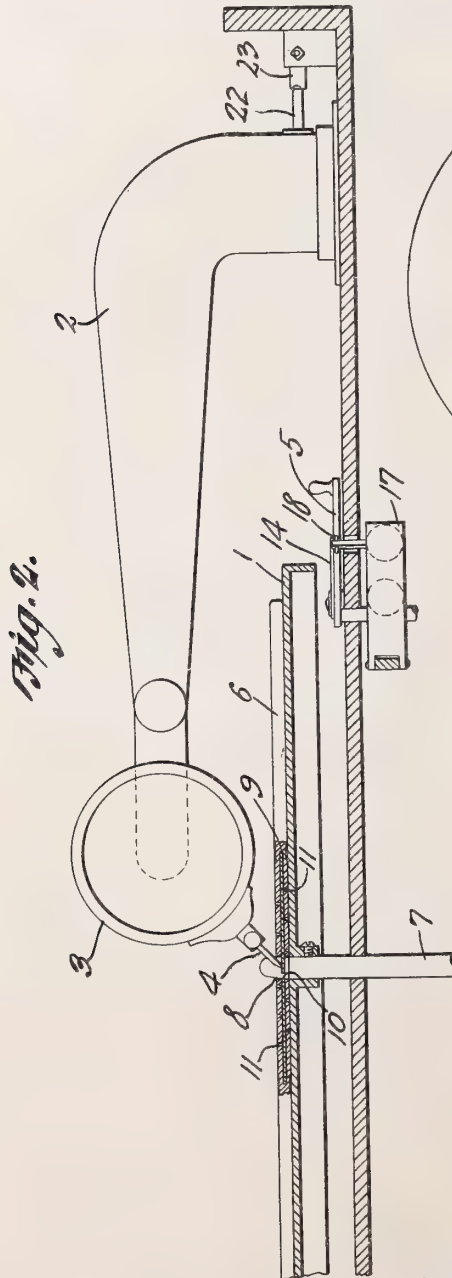


Fig. 2.

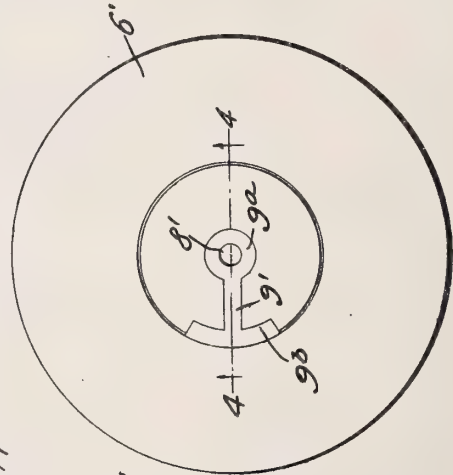


Fig. 3.

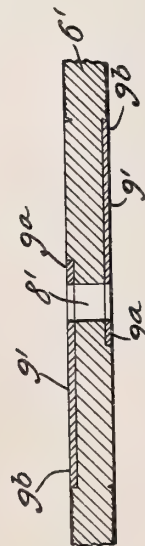


Fig. 4.

Witnesses

J. R. Turner
House E. Miller

Chester Y. Clawson Inventor

by *C. A. Snow & Co.*
Attorneys

UNITED STATES PATENT OFFICE.

CHESTER Y. CLAWSON, OF SALT LAKE CITY, UTAH.

ARRESTER FOR SOUND-PRODUCING APPARATUS.

1,190,112.

Specification of Letters Patent.

Patented July 4, 1916.

Application filed April 27, 1915. Serial No. 24,275.

To all whom it may concern:

Be it known that I, CHESTER Y. CLAWSON, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented a new and useful Arrester for Sound-Producing Apparatus, of which the following is a specification.

The present invention appertains to an arrester or stopping device for sound producing apparatus, such as phonographs, and aims to provide novel and improved means for stopping the turn table or record carrier when the needle of the reproducer has reached the end of the sound or phonic groove.

As a specific object, the invention aims to provide a metal member or conductor carried by the record and adapted to close an electrical circuit when the needle reaches the end of the phonic groove, for purpose of actuating the brake lever to brake applying position.

It is also within the scope of the invention to provide an appliance of the nature indicated, which is comparatively simple and inexpensive in construction, which may be readily applied to various sound producing apparatus, and which will be thoroughly efficient and practical in use.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a plan view of a sound producing apparatus embodying the improvements, portions being broken away, and the electrical circuit being illustrated diagrammatically. Fig. 2 is a fragmental elevation of the sound producing apparatus embodying the improvements, portions being broken away. Fig. 3 is a reduced plan view of a disk record embodying modified means for closing the electrical circuit. Fig. 4 is an enlarged section taken on the line 4—4 of Fig. 3.

In the drawings, there is illustrated a fragmental portion of a phonograph or

sound producing apparatus, the same embodying a turn table or rotatable record carrier 1, and a swinging sound arm 2 having a vertically swingable reproducer 3 at its free end. The reproducer 3 has the usual needle 4, and the usual brake lever 5 operates the brake (not shown) for stopping the machine in the usual manner, but since the details of the brake are well known and may be of various constructions, it is not deemed necessary to illustrate or describe the brake in detail. A disk record 6 is removably seated upon the turn table 1, the turn table 1 being carried by the rotatable spindle or shaft 7, and the record 6 having a central aperture 8 for receiving the upper protruding end of the spindle for centering the record in the usual manner. The foregoing parts are common in sound producing apparatus, and need no lengthy description.

In carrying out the invention, a disk 9 of metal or other material which is a conductor of electrical energy, is embedded within the record 6 between the faces thereof, and is provided with a central aperture 10 registering or coinciding with the aperture 8 of the record to receive the upper protruding end of the spindle 7 and whereby the disk 9 engages the spindle to be in electrical connection therewith. The record 6 is of insulating material, as usual, and the disk 9 is utilized for closing an electrical circuit when the needle reaches the end of the phonic groove. In order to enable the needle 4 to engage the disk 9 when the needle reaches the end of the phonic groove, each face of the record 6 is provided with a deep groove 11 extending spirally from the aperture 8 to the end of the phonic groove. The spiral grooves 11 extend in the same directions as the spiral phonic grooves on the faces of the record, and the grooves 11 extend to the disk 9 so that the said disk forms the bottom of the grooves 11 and separates the grooves at the opposite sides of the record. It will be evident that if the record 6 is only provided with a single active face, but one groove 11 will be required upon the said active face. The disk 9 is disposed completely between the faces of the record and between the ends of the phonic grooves in the opposite faces of the record, and the disk 9 being in engagement with the spindle 7 will be grounded through the spindle and metallic parts of the motor (not shown).

The electrical circuit includes a conductor

or wire 12 connected to the spindle 7 or other part of the machine in electrical connection with the spindle 7 and the metallic brake lever 5, and an insulated spring contact 14 coöperates with the brake lever 5 whereby when the brake lever 5 is swung to release the brake, it will engage the spring contact 14. A conductor 15 connects the contact 14 and a pair of electromagnets 16, and a pivoted armature 17 coöperates with the electromagnets and is connected by means of a link 18 with the brake lever 5, whereby when the armature 17 is attracted by the electromagnets 16, the brake lever 5 will be swung to brake applying position. The electromagnets 16 are connected by means of a conductor or wire 19 with a battery or other source of electrical energy 20, and said battery is connected by means of a conductor or wire 21 with the sound arm 2 which is metallic or a conductor of electrical energy. The disk 9, spindle 7, brake lever 5, contact 14, electromagnet 16, battery 20, sound arm 2, and needle 4 are thus connected in series, and when the needle 4 is removed from the end of the phonic groove, such as when the selection is being played, the record 6 will provide an insulation between the needle 4 and disk 9 for normally opening the circuit.

In operation, when the needle 4 reaches the end of the phonic groove, it will drop into the upper spiral groove 11 and will therefore contact with the disk 9, for closing the circuit through the disk 9, conductor 12, brake lever 5, contact 14, conductor 15, electromagnets 16, conductor 19, battery 20, conductor 21, sound arm 2, reproducer 3, and needle 4, and the electromagnets 16 being energized will attract the armature 17 and thus swing the lever 5 to brake applying position. This will apply the brake for stopping the turn table 1, and at the same time the brake lever 5, which acts as a switch, will be moved away from the spring contact 14 to open the circuit and reduce to a minimum the amount of current consumed for operating the brake device. It is of course understood that each of the records employed in connection with the sound producing apparatus is equipped with a disk or conductor 9 for closing the electrical circuit when the needle reaches the end of the phonic groove. As an auxiliary or secondary means for stopping the turn table, a contact finger 22 is secured to the heel of the sound arm 2, and coöperates with a spring contact 23 which is connected by means of a conductor or wire 24 to the conductor 15. The contact finger 22, spring contact 23, conductor 24, electromagnets 16, conductor 19, battery 20, and conductor 21 are thus connected in series. In other words, the contact finger 22, spring contact 23 and conductor 24 form a shunt connected to the main

circuit, whereby when the sound arm 2 is swung sufficiently by reason of the needle 4 reaching the end of the phonic groove, the contact finger 22 will engage the spring contact 23 for closing the circuit through the conductor 24, electromagnets 16, conductor 19, battery 20, conductor 21, contact finger 22, and spring contact 23. This will attract the armature 17 and swing the lever 5 to brake applying position. As a result, if the main circuit is not closed for any reason whatever, the secondary circuit will be closed for operating the brake properly. Attention is directed to the fact that the spiral groove 11 will receive the needle 4 when it reaches the end of the phonic groove and will carry the needle 4 inwardly or toward the spindle 7 for forcibly swinging the arm 2 to bring the contact finger 22 thereof into engagement with the spring contact 23 for closing the secondary circuit. The spiral groove 11 thus serves the dual function in exposing the contact disk 9 to the needle 4, and of carrying the needle 4 inwardly so that the secondary circuit will be closed if the primary circuit is not closed. The secondary circuit may be employed independently of the primary circuit, and as illustrated the two circuits have the common electromagnets 16 and battery 20.

In the modification illustrated in Figs. 3 and 4, the disk record 6' having the central aperture 8' to engage the spindle of the sound producing apparatus, is provided with different means for closing the electrical circuit. Thus, a radial metallic strip 9' is embedded in the record flush with each face thereof, the inner ends of the strips 9' having eyes 9^a surrounding the aperture 8', and the outer ends of the strips 9' having arcuate contacts 9^b extending along the end convolutions of the phonic grooves. The strips 9' project in opposite directions to balance the record. When the record 6' is applied to the spindle of the machine upon the turn table, the upper strip 9' will be brought into electrical connection with the spindle due to the eye 9^a embracing the spindle, and when the needle of the reproducer reaches the end of the phonic groove it will engage the upper contact 9^b for closing the electrical circuit, as will be apparent from the foregoing.

What is claimed is:

The combination with a turn table, a spindle carrying the same, a brake applying device for stopping the turn table, a member of insulating material seated upon said turn table, and a swinging arm having an element to ride upon said member and move toward said spindle, of a disk embedded in said member and having an aperture to receive said spindle whereby the disk engages the spindle, and an electrical circuit terminally connected to said element and spindle and including a source of electrical

energy and electrically operated means co-
operating with said brake applying device
to move it to brake applying position, said
member having a spiral groove for receiving
5 said element and extending to said disk and
aperture whereby the disk forms the bottom
of said groove upon which said element
rides.

In testimony that I claim the foregoing as
my own, I have hereto affixed my signature 10
in the presence of two witnesses.

CHESTER Y. CLAWSON.

Witnesses:

SHIRLEY Y. CLAWSON,
L. GRANT FOX.

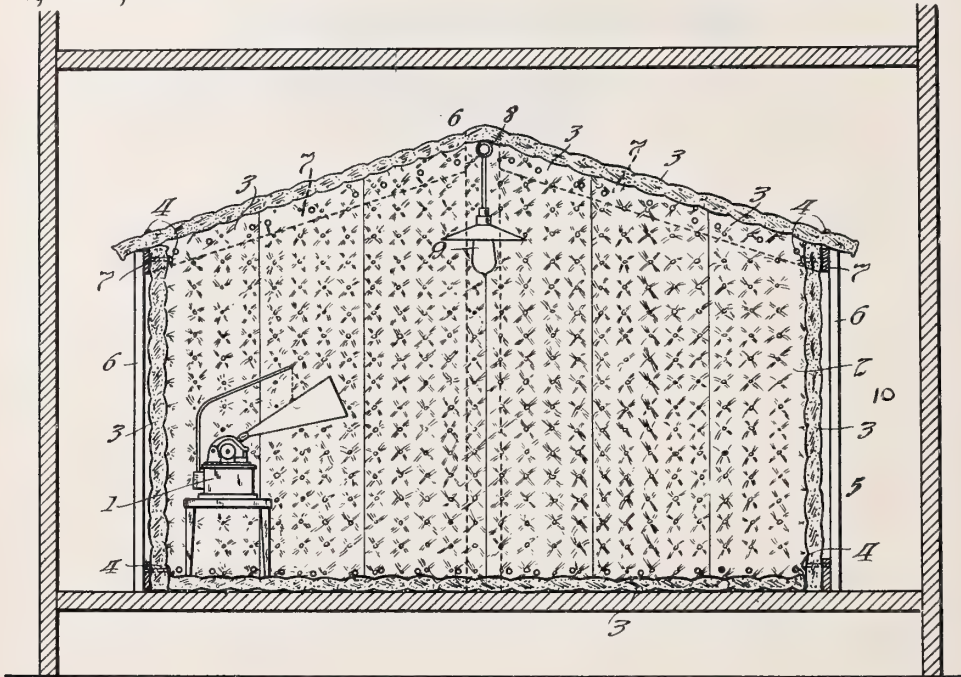
**Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."**

MEANS FOR RECORDING SOUNDS,
#1,190,133-----T. A. Edison
Patented-July 4th, 1916.
Filed-February 16th, 1912.

T. A. EDISON.
 MEANS FOR RECORDING SOUNDS.
 APPLICATION FILED FEB. 16, 1912.

1,190,133.

Patented July 4, 1916.



Witnesses:

Frank D. Lewis
Frederick Pachmann

Inventor:

Thomas A. Edison
By Frank L. Owen
his Atty.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR TO
NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION
OF NEW JERSEY.

MEANS FOR RECORDING SOUNDS.

1,190,133.

Specification of Letters Patent.

Patented July 4, 1916.

Application filed February 16, 1912. Serial No. 678,065.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Means for Recording Sounds, of which the following is a description.

My invention relates to means for recording sounds and more especially to an improved chamber within which to record sounds, the invention herein disclosed being an improvement on that disclosed in my co-pending application, Serial No. 669,868, filed January 6, 1912.

The object of my invention is to produce improved means by which a faithful and correct record having good acoustic properties may be obtained.

As set forth in my application above referred to, when the sounds from a given source are recorded in a room having rigid walls, as has heretofore been customary, the walls of the room reflect the sound waves, and these reflected waves after one or more reflections enter the horn of the recording instrument together with the true waves direct from the sound source, all of these waves being greatly amplified by the recording horn. As the reflected sound waves reach the recording instrument later than the direct waves, an objectionable sound interference is caused; so that when a record made in this way is reproduced, the reproduced sound is found not only to be different from that emanating directly from the original sound source, but also to be less agreeable and harmonious. When the source of sound is in close proximity to the horn of the recording instrument, this depreciation in quality is not very noticeable, but when it is at a considerable distance from the horn, as is necessarily the case with the different instruments of an orchestra which is rendering the selection to be recorded, the depreciation in quality is considerable, this depreciation in many instances being so great that the reproduction of the sound as recorded for some of the instruments is very disagreeable. I have discovered that the recording of these reflected waves is the cause of the difference in quality between the sound as heard by the ear directly from the original sound source and as heard from the ordinary

phonograph record; and my invention accordingly contemplates the provision of means for eliminating the reflected sounds or sound waves from the record.

The improved means devised by me for attaining the desired results comprises generally a recording chamber having walls which are non-sound reflecting and also preferably non-sound transmitting; so that none of the sounds emanating from the source are reflected back by the walls into the recording instrument, nor any annoying sounds from without the chamber transmitted to the said instrument. By placing the source of sound and recording instrument in such a chamber, only the true sound waves direct from the sound source are recorded, and a record of good acoustic properties is thereby obtained.

In order that my invention may be better understood, attention is hereby directed to the accompanying drawing forming a part of this specification and in which the figure illustrates in vertical cross section one form of apparatus embodying my invention.

Referring to the drawing, a recording phonograph, which is shown diagrammatically at 1, is located within the chamber 2, which is of suitable size and proportions to permit the singers or other sources of sound to be arranged in proper recording position with respect to the horn of the phonograph. The walls of the chamber 2 are built up of a number of elastic or yielding mattress-like sections 3, each preferably being from about two to three inches in thickness, the yielding character of said sections preventing the reflection thereby of the sound waves impinging thereon. Each of the said sections is filled or stuffed with sound absorbing material, such as asbestos or other suitable fibrous material mixed with powdered magnesite, chalk, or other powdered material, a mixture of asbestos and magnesite or chalk being preferable because of the lightness and excellent sound absorbing qualities of these substances. The magnesite or other powdered material fills the interstices between the fibers of the asbestos or other fibrous material and assists the latter in the frictional absorption of the sound waves which pass into the filling of the walls. The outer covering or casing of the sections 3 may be made of silkline, mercerized cotton, or any other thin yielding fabric. For holding

the sections 3 detachably in place, pins or projections 4 are secured to a frame 5 and pass through small holes in the said sections. As shown in the drawing, the frame 5 comprises a number of vertical members 6, and horizontal or suitably inclined members 7 connecting the tops of the members 6. A pipe or other hollow supporting member 8 extends across the center of the chamber, this pipe serving to contain the wires for a lamp 9. In order to completely insure against the possible entry of annoying sounds from without, I preferably provide my improved recording chamber with double sound-proof walls as by inclosing the chamber 2 within an outer chamber 10, the walls of which latter are separated by an air space from the walls of the chamber 2.

The source of sound and the phonograph or other recording instrument having been placed in proper relative positions in the chamber 2, the phonograph is started and the sound waves to be recorded are transmitted from the source toward the phonograph horn. Those sound waves which do not pass directly to the phonograph pass into the walls of the chamber 2, where they are absorbed as heat by friction with the asbestos and magnesite or other filling of the said walls. All sounds without the chamber are excluded therefrom by the use of the double sound-proof walls, this exclusion being made complete by the sound-absorbing character of the inner walls. A record made in this way accordingly contains only the true sound waves direct from the source and may be caused to reproduce the said waves with exceeding purity and naturalness.

It is understood that I do not limit myself to the specific construction above specified for the walls of the chamber 2 or for the manner of supporting the said walls and that many modifications may be made in the specific structure disclosed without departing from the spirit of my invention.

What I claim as new and desire to protect by Letters Patent is as follows:

1. A sound recording chamber having yielding walls containing a mixture of fibrous and powdered materials, substantially as described.

2. A sound recording chamber having yielding walls containing a mixture of fibrous and powdered materials of low specific gravity, substantially as described.

3. A sound recording chamber having yielding walls containing a mixture of a fibrous material and powdered magnesite, substantially as described.

4. A sound recording chamber having yielding walls containing powdered magnesite, substantially as described.

5. A sound recording chamber having walls containing powdered material, all the inner surfaces of said walls being sufficiently yielding as to be substantially non-sound reflecting, substantially as described.

6. A sound recording chamber having yielding walls containing asbestos fiber and a powdered material of low specific gravity, substantially as described.

7. A sound recording chamber having yielding walls containing asbestos fiber and powdered magnesite, substantially as described.

8. A sound recording chamber having yielding non-sound reflecting inner walls containing a mixture of fibrous and powdered materials of low specific gravity, and outer walls spaced from said inner walls, substantially as described.

9. A sound recording chamber having yielding non-sound reflecting inner walls containing a mixture of a fibrous material and powdered magnesite, and outer walls spaced from said inner walls, substantially as described.

10. A sound recording chamber having yielding non-sound reflecting inner walls containing powdered magnesite, and outer walls spaced from said inner walls, substantially as described.

11. A sound recording chamber having inner walls containing powdered material, all the inner surfaces of said walls being sufficiently yielding as to be substantially non-sound reflecting, and outer walls spaced from said inner walls, substantially as described.

12. A sound recording chamber having yielding non-sound reflecting inner walls containing asbestos fiber and powdered magnesite, and outer walls spaced from said inner walls, substantially as described.

13. A sound recording chamber having walls composed of mattress-like sections, said sections containing powdered sound-absorbing material and the covering thereof consisting of fabric-like material sufficiently yielding as to be substantially non-sound reflecting, substantially as described.

14. A sound recording chamber having inner walls and outer side and top walls spaced at all points from and unconnected with said inner walls, all the inner surfaces of the inner walls being sufficiently yielding as to be substantially non-sound reflecting, substantially as described.

This specification signed and witnessed this 15th day of February 1912.

THOS. A. EDISON.

Witnesses:

FREDERICK BACHMANN,
ANNA R. KLEHM.

SOUND REPRODUCING MACHINE,
#1,190,249-----P. B. Delany,
Patented-July 4th, 1916.
Filed-May 29th, 1912.

P. B. DELANY.
SOUND REPRODUCING MACHINE.
APPLICATION FILED MAY 29, 1912.

1,190,249.

Patented July 4, 1916.
2 SHEETS—SHEET 1.

Fig. 1.

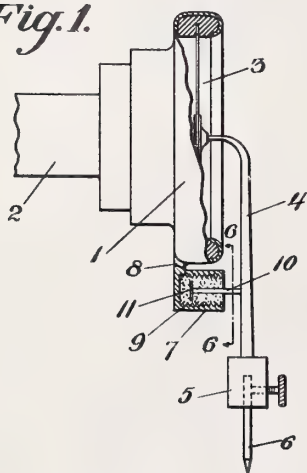


Fig. 2.

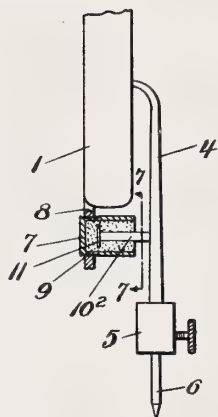


Fig. 3.

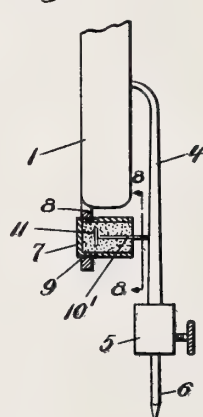


Fig. 4.

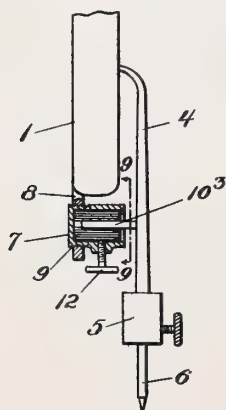


Fig. 5.

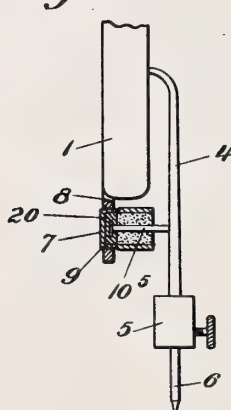


Fig. 6.

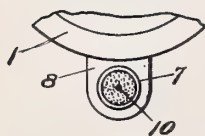


Fig. 7.

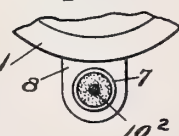


Fig. 8.



Fig. 9.



Witnesses:
L. J. Browning
M. L. Smith

Patrick D. Delany Inventor
By his Attorney
Edward C. Davidson

P. B. DELANY.
SOUND REPRODUCING MACHINE.
APPLICATION FILED MAY 29, 1912.

1,190,249.

Patented July 4, 1916.
2 SHEETS—SHEET 2.

Fig. 10.

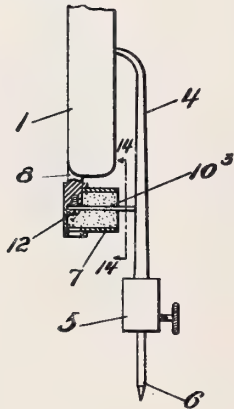


Fig. 11.

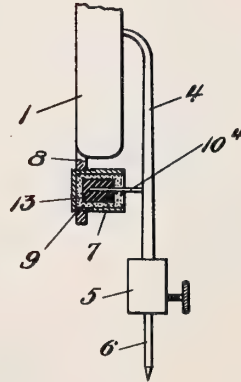


Fig. 12.

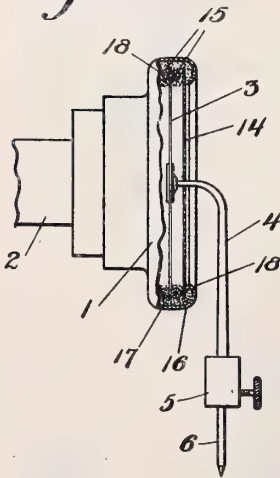


Fig. 13.

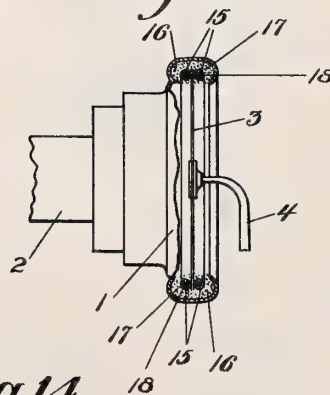


Fig. 14.



Witnesses:
L. F. Browning
M. L. Smith

Inventor
Patrick B. Delany
By *his Attorney*
Edward C. Davidson

UNITED STATES PATENT OFFICE.

PATRICK B. DELANY, OF SOUTH ORANGE, NEW JERSEY.

SOUND-REPRODUCING MACHINE.

1,190,249.

Specification of Letters Patent.

Patented July 4, 1916.

Application filed May 29, 1912. Serial No. 700,394.

To all whom it may concern:

Be it known that I, PATRICK B. DELANY, a citizen of the United States, residing at South Orange, county of Essex, State of New Jersey, have invented a certain new and useful Improvement in Sound-Reproducing Machines, of which the following is a specification.

This invention relates to phonographs or talking machines and to the production of records therefor. Its object is to improve the quality of the musical tones or vocal utterances and to improve the behavior of the apparatus in other respects.

In the accompanying drawings: Figures 1, 2, 3, 4 and 5 are respectively elevations partly in section, somewhat diagrammatic, illustrating a reproducer head and needle arm with my improvements applied thereto; Fig. 6 is a section on the line 6, 6, of Fig. 1; Fig. 7, a section on the line 7, 7, of Fig. 2; Fig. 8, a section on the line 8, 8, of Fig. 3; Fig. 9 a section on the line 9, 9, of Fig. 4; Fig. 10, a view similar to Fig. 1 showing a modification; Fig. 11, a like view showing a further modification; Fig. 12, a like view showing a modification in the reproducer head; Fig. 13, a transverse section through the reproducer head showing a manner of holding the reproducer disk; Fig. 14, a section on the line 14, 14, of Fig. 10.

1 indicates the reproducer head of which 2 is the sound emitting neck for connection with a horn or otherwise.

3 is the reproducer diaphragm mounted in the reproducer head in the ordinary way or otherwise, as hereinafter described.

4 is the reproducer arm attached at one end to the center of the reproducer diaphragm and carrying at its free end a needle head 5 adapted to receive a needle 6 to cooperate with the record. Of course, the shape of the record or record carrier is immaterial. It may be a disk or be cylindrical or otherwise.

Between the reproducer arm and its support, *i. e.* the reproducer head or other part, is a means of preventing transmission of vibrations from the arm to the support and vice versa. Such vibrations are absorbed, smothered or suppressed by said means. This means is preferably non-metallic and may be a compound of gums, waxes, etc. It should, by preference be a tenacious adhesive material or compound, and should be of such character as not to respond to and

transmit the vibrations in question. Moreover it should preferably be of such a nature that its characteristics with respect to hardness and vibratility will not vary very materially with changes of temperature.

I am aware that it has been proposed to introduce between the reproducer arm and head means designed to prevent vibrations being transmitted from one to the other: and I do not, therefor, broadly claim such an idea. Experience has demonstrated that my organization, hereinafter described, is highly efficient and results in marked improvement in the purity and quality of reproduced tones, and perfection of records since the improvements are also applicable to recording machines, although particularly intended for reproducing machines.

On the support of the producer head is a cup-like receptacle or container 7, the closed end of which may, if desired, be mounted upon the support 8 of the reproducer head by a screw thread connection 9 that permits of adjustment of the container. Within this container is placed the means for prevention of transmission of vibrations, *i. e.* a mass of material having the characteristics referred to. Embedded in this mass of material is a projection 10 rigidly secured to and extending from the reproducer arm. In this way, the reproducer arm is afforded a suitable support and yet the object of this invention is attained.

The arm 10 or supporting extension of the reproducer arm 4 in Fig. 1 may be a round wire and, although it is not essential to the performance of the invention, it is provided with a cross head 11 on its inner end that gives it an anchorage in the mass of vibration absorbing means. This wire 10 may be, and preferably is, of such character and dimensions as to be reasonably elastic.

Fig. 3 shows a similar arrangement except that the supporting arm attached to the reproducer arm is a flat spring 10' which may also be provided with a cross head 11 to give an anchorage in the mass. Preferably, the greatest dimension of this flat spring is placed at right angles to the length of the reproducer arm.

In Fig. 2, the supporting arm projecting from and secured to the reproducer arm is a relatively non-elastic post 10".

In the construction of Figs. 1 and 3, the elasticity required for movements of the

reproducer arm may reside in the arms 10, 10', or in these arms and also in the mass in which the arms are embedded. In the construction of Fig. 2 the necessary mobility of the reproducer arm may reside primarily in the mass.

In Fig. 4 there is an arm 10³ projecting from the reproducer arm but in this modification it is wrapped with adhesive tape to form a cylindrical mass that is seated in the retainer 7 and held therein by a set screw 12.

In Fig. 5 the container 7 has fixed in its bottom a block 20 of vulcanite, vulcanized fiber or like hard substance in which the end of arm 10⁵ is secured and around the arm within the container is placed the vibration absorbing material.

In Fig. 10 there is an arm 10³ extending from the reproducer arm through a container 7 surrounded by the mass and having its end rigidly secured by a screw 12 or otherwise to the support of the reproducer head. Here there is a direct metallic connection of the arm 10³ which however is surrounded and in contact with the mass contained in the container. This is a form that experience has shown produces highly advantageous results. Approximately like Fig. 5 in which by means of the vulcanite block the arm 10⁵ is held substantially rigid with respect to the container and its support.

Fig. 11 shows a further modification. Here, as before, there is an arm 10⁴ projecting from the reproducer arm. Its end is embedded in a block 13 of rubber of adequate hardness, preferably somewhat harder than an average rubber pencil eraser. In the container 7 surrounding and in contact with this rubber block is the mass of material.

Fig. 12 shows an arrangement in which there is secured in the head in rear of the diaphragm 3 a diaphragm 14 having a central aperture for the passage to the diaphragm 3 of the end of the reproducer arm. The purpose of this diaphragm 14 is to maintain on the rear side of the reproducer diaphragm an air pressure approximately equal to the air pressure on the front or outer side, the effect being to produce a more even and generally satisfactory behavior of the apparatus.

The next feature of this invention relates to the manner of securing the reproducer diaphragm in its head and is shown in sufficient detail in Figs. 12 and 13. Here the diaphragm 3 is held between two circular gaskets 15 and the circumferential part of the reproducer head is formed interiorly with an annular chamber 16 in which the gaskets and edge of the diaphragm are located. A filling 17 of adhesive compound is packed in chamber 16, surrounds the

gaskets, embraces the edge of the diaphragm and serves to attach the diaphragm and gaskets to each other adhesively. The gaskets are preferably cylindrical in cross section and may consist of rubber tubes of appropriate hardness within which are disposed cores of wire or of vulcanized rubber of greater hardness than the tubes, or cores of other character may be employed.

18 indicates the cores disposed within the tubular gaskets.

The adhesive compound serves to protect the rubber gaskets from oxidation and consequent deterioration because of atmospheric influences, and therefore the rubber retains its initial characteristics for long periods of time and the diaphragm is held at its edges under substantially uniform conditions. To afford an appropriate finish a ring may be expanded within the head and against the gaskets, or mass surrounding them.

The container may be and preferably is cast in one piece with the head as in Fig. 1, or may be separately formed and attached to the head by a screw thread, as in several of the figures, or otherwise. It is considered desirable that the inner side walls of the retainer be roughened in a manner to prevent displacement or withdrawal of the non-vibratory mass; and for that purpose they may be screw threaded as shown at 9' in Fig. 1.

A material for use at the support of the stylus arm or bar and suitable for the purpose of this invention should be, when heated, fluid or plastic, so as to be readily cast or molded at the point of support of the stylus bar, and also be adhesive to insure intimate contact with the parts of the support. It should, when set, be solid and retentive of form; be durable and unchangeable under all ordinary weather conditions; be inert to vibrations, *i. e.* non-transmissible to vibrations, but should possess adequate local molecular mobility under the slight vibratory movements of the support embedded therein. Material having these characteristics has been found in compounds consisting of Stockholm tar, resin, gutta percha, etc. which in practice have produced very satisfactory results. It may consist of one part by weight of Stockholm tar, one part by weight of resin and three parts by weight of gutta-percha. Such a mixture produces a meltable mass which on cooling becomes hard and has the desired characteristics before mentioned.

In my copending application for Patent No. 739,939, filed Jan. 3, 1913 I have claimed a construction involving a diaphragm held in place by a retaining gasket consisting of a non-stretchable core of wire or other relatively hard material covered with insulating material which is molded on the core.

In my application for Patent No. 867,709, 130

filed Oct. 21, 1914 I have claimed a method herein generally described of connecting certain parts of the reproducing mechanism of a talking machine.

5 In by copending application, No. 867,710, filed Oct. 21, 1914, I have shown certain improvements on the invention herein claimed and have claimed among other things a construction in which the support for the stylus
10 arm is rigidly attached to said arm and is rigidly connected with the head which carries the diaphragm and in which a fixed plastic mass inert to vibrations, embraces the sides of said support. I have also claimed
15 in said application, No. 867,710, a construction in which the stylus arm of the diaphragm carries a flexible metallic part embedded in a yielding meltable mass.

I claim:

20 1. In a talking machine, the combination of a diaphragm, a vibrating arm coöperating therewith and having a lateral projection, a support for said lateral projection, and a meltable mass interposed between said support
25 and said projection.

2. In a talking machine, the combination of a diaphragm, a holder in which it is mounted, a vibrating arm coöperating with the diaphragm and provided with a lateral
30 projection, a support for said projection carried by the diaphragm holder, and a meltable mass interposed between said support and said projection.

3. The combination of a diaphragm, its
35 holder, an arm coöperating with the diaphragm, a plastic mass attached to the holder and positioned to one side of the arm, and a support attached to said arm and embedded in the plastic mass.

40 4. The combination of a diaphragm, an arm coöperating therewith, a fixed container, a plastic adhesive compound within the container, the container and compound being positioned at one side of the arm, and a support
45 projecting from said arm and embedded in the plastic compound.

5. The combination of a diaphragm, its head or holder, a coöperating vibrating arm, a support for said arm rigidly attached
50 thereto and projecting laterally therefrom, and a fixed plastic mass inert to vibrations

embracing the sides of said support and connecting it with the diaphragm head or holder.

6. The combination of a diaphragm, its
55 coöperating vibrating arm, a support projecting from said arm and a fixed meltable plastic adhesive mass in which said support is embedded.

7. In a sound box for talking machines,
60 the combination of a diaphragm, its actuating member, a support for said member projecting laterally therefrom, a holder for the outer end of said projection, and a yielding meltable mass connecting the projection with
65 said holder.

8. In a sound box for talking machines, the combination of a diaphragm, its actuating member, and a support for said member comprising a metallic part connected with
70 the actuating member, and a suitably supported meltable mass firmly connected with said metallic part.

9. The combination of a diaphragm and a retaining gasket therefor, consisting of
75 a relatively hard non-stretchable core closely inclosed with adhering insulating material.

10. The combination of a diaphragm and a retaining gasket therefor, consisting of a non-stretchable wire core and a covering of
80 insulating material closely surrounding and adhering to the core.

11. The combination of a diaphragm, a supporting frame therefor, a pair of retaining gaskets on opposite sides of the dia-
85 phragm within the frame each composed of a relatively hard core covered with closely adhering insulating material and an adhesive plastic material applied to the gaskets and the edge of the diaphragm and which
90 connects them with said frame.

12. In a talking machine reproducer, a diaphragm mounted between non-stretchable wires covered with insulating material and embedded in a plastic preparation.
95

In testimony whereof, I have hereunto subscribed my name.

PATRICK B. DELANY.

Witnesses:

LAURA E. MUTH,
L. S. BROWNING.

UNITED STATES PATENT OFFICE.

WILLIAM J. BURNS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE PEERLESS VULCANITE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF CONNECTICUT.

PROCESS OF FORMING ARTICLES FROM PLASTIC MATERIAL.

1,190,510.

Specification of Letters Patent.

Patented July 11, 1916.

No Drawing.

Application filed April 18, 1916. Serial No. 92,035.

To all whom it may concern:

Be it known that I, WILLIAM J. BURNS, a citizen of the United States, residing at Bridgeport, county of Fairfield, State of Connecticut, have invented an Improvement in Processes of Forming Articles from Plastic Material, of which the following is a specification.

This invention has for its object the production of articles from plastic material, which shall be perfect in form and finish, and may be produced very much more rapidly and economically than has heretofore been possible.

The process now in general use of molding plastic articles is substantially as follows: A mass of the material, rendered plastic by heat, is placed in the mold and is caused to flow or spread over the surface of the mold by the application of the necessary amount of pressure. The results obtained have been more or less unsatisfactory, owing to the various difficulties in carrying out the process. The plastic mass is apt to be either too hard or too soft, and is frequently found to contain foreign substances, and when the molds are subjected to pressure to spread the mass and to polish and finish the articles, the molds are often seriously damaged and sometimes destroyed by the foreign substances.

In carrying out my novel process, I first crush the material into relatively small particles, if preferred, to a powder. The special composition used is immaterial so far as my novel process is concerned, the process being applicable to any of the plastic compositions in general use in the manufacture of molded articles, for example, a composition consisting of gum copal, barytes, terra alba, and lamp black. It is likewise immaterial what special mechanical means are used in carrying out the process. It is sufficient for the purposes of this specification to state that the mold, upon a suitable carrier or holder, is placed under a suitable box or sieve containing the composition and a light coating or layer of the particles of material is deposited upon the mold, being sifted as it is deposited so as to insure that nothing injurious can pass to the mold. The mold with the layer of particles of the material upon it is then passed through an oven and

heated sufficiently to expel all the gases and vapor from the material and render it plastic. Another thin coating or layer of the particles of material is then applied in the same manner and the mold passed through an oven and the material rendered plastic and the gases and vapor expelled as before, the alternate application of layers of the material and subjection of the material to sufficient heat to expel the gases and vapor being repeated until the required amount of material is in the mold. The mold is then closed and the material therein is subjected to a heating and pressing operation and then to a cooling operation.

The result of my novel process is the obtaining of articles having true surfaces which are sharper in outline, are of standard weight and are stronger and more durable than when produced by the ordinary process. The heating and spreading of the particles of material upon the mold prior to the application of pressure has the effect of obviating the various inconveniences of the ordinary process and moreover enables me to produce the articles much more expeditiously and with less labor than has heretofore been possible. When made by my novel process the labor of trimming or edging the articles is reduced to the minimum.

Having thus described my invention, I claim:

1. The process of forming articles from plastic material which consists in crushing the material into particles, depositing a layer of the particles upon a mold, subjecting the material to heat sufficient to expel the gases and vapor, depositing one or more additional layers of the crushed material upon the material in the mold, subjecting each additional deposit of the crushed material to heat to expel the gases and vapor, and then subjecting the material to pressure to give it the required form.

2. The process of forming articles from plastic material which consists in crushing the material into particles, depositing the material in layers upon a mold, expelling the gases and vapors from each layer of the material by the application of heat, and then subjecting the material to pressure.

In testimony whereof I affix my signature. WILLIAM J. BURNS.

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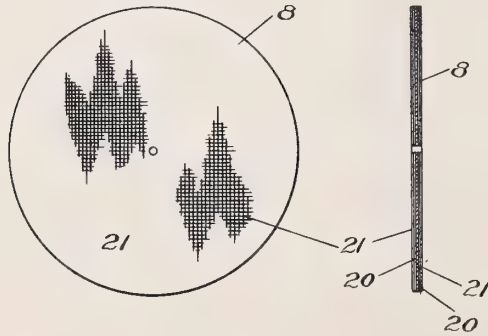
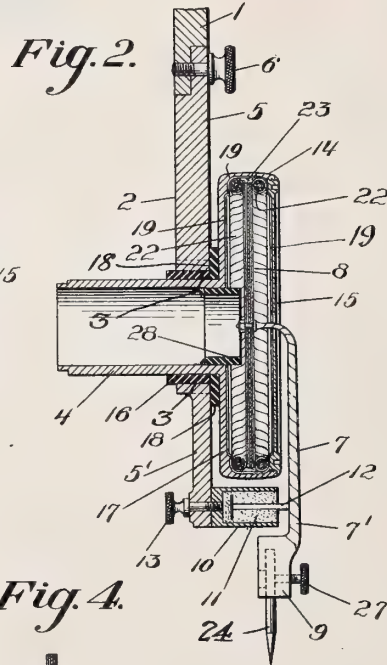
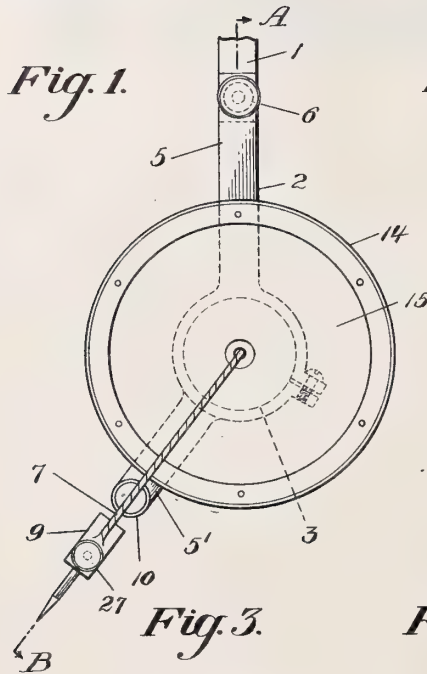
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1190015
TALKING MACHINE,
#1,190,635-----P. B. Delany,
Patented-July 11th, 1916.
Filed-January 3rd, 1913.

P. B. DELANY.
TALKING MACHINE.
APPLICATION FILED JAN. 3, 1913.

1,190,635.

Patented July 11, 1916.



Witnesses:
L. J. Browning
M. L. Smith

Patrick B. Delany, Inventor
By *Edward C. Casdian*
Attorney

UNITED STATES PATENT OFFICE.

PATRICK B. DELANY, OF SOUTH ORANGE, NEW JERSEY.

TALKING-MACHINE.

1,190,635.

Specification of Letters Patent.

Patented July 11, 1916.

Application filed January 3, 1913. Serial No. 739,939.

To all whom it may concern:

Be it known that I, PATRICK B. DELANY, a citizen of the United States of America, residing in South Orange, county of Essex, State of New Jersey, have invented a certain new and useful Improvement in Talking-Machines, of which the following is a specification.

This invention is more particularly applicable to reproducing machines and its objects are to improve the behavior of such machines. The record with which this invention may be used may be of any well known or appropriate character.

In the accompanying drawing: Figure 1 is a side elevation: Fig. 2, a section on the line A, B, of Fig. 1: Fig. 3, a face view of a reproducer diaphragm: Fig. 4, a transverse section thereof.

1 indicates the end of the swinging arm that carries the reproducer head as a whole.

2 is what I term an extension piece having an enlarged central aperture 3 to embrace the neck 4 of the reproducer head or sound box in which the diaphragm is mounted. This extension piece has a branch 5 in one direction which by means of a bolt 6 may be attached to the end of arm 1. A second branch 5' of the extension piece carries means of affording a support for the vibrating reproducing arm 7 attached at one end to the diaphragm 8 and at the other end having a needle holder 9 in which is secured by a screw 27 the needle 24. The particular vibrating arm support of the character indicated forms the subject matter of an application heretofore filed by me (No. 700,394, filed May 29, 1912) and is as follows: Such supporting means comprise a receptacle or container 10 filled with a mass of material 11 inert to vibrations and in which is embedded an arm or rod 12 attached rigidly to the vibrating arm 7 and extending laterally therefrom into or through the mass of the vibration-absorbing or vibration eliminating material in the receptacle or container 10. The container 10 is shown as a separately formed cup held on the end of branch 5' by a clamp bolt 13.

The reproducer head comprises the neck 4 that carries the sound box 14 in which is mounted the reproducer diaphragm 8. The outer face of the sound box is closed, except for a central opening, by a cover plate or diaphragm 15. The neck 4 passes through the aperture 3 of the extension piece 2, the

two being firmly united preferably with an intervening bushing 16 of a suitable material or compound inert to transmission of vibrations; and between the side 17 of the sound box and the extension piece is interposed a washer 18 of material inert to vibrations. In this way the neck and sound box are insulated from disturbing vibrations that otherwise might pass from the swinging arm 1 to the reproducer diaphragm: and also the vibrating arm 7, co-operating with the diaphragm, is insulated in the manner described from vibrations that may be taken up or imparted to the extension piece 2 and the parts carried thereby: and also the vibrating arm is insulated because of its manner of support in such way that its vibrations will not be transmitted through its support.

The purpose of the various features thus far described is to enhance the purity of reproduced sounds and utterances.

For the purpose of further eliminating extraneous and unpleasant qualities in the reproduced sounds, I coat the sound box, preferably on the inside, with a layer of paint or composition,—as for instance, asphaltum varnish or a paint-like solution of adhesive compound. This coating is, of course, thin and is exaggerated in the drawing for the purpose of illustration and is marked 19. I have also found that good results are produced by lining the sound box and neck with a fabric such, for instance, as silk,—preferably a soft unfilled variety or with thin paper. Such fabric lining is also indicated by 19. A convenient way of applying the fabric would be to first put on the surface a thin coat of paint or varnish and apply the fabric while such coating is yet wet.

To further improve the quality of reproduced tones, I have found that advantageous results are attained by a special construction of the diaphragm. This feature is illustrated in Figs. 3 and 4. Diaphragms ordinarily used in talking machines have been made of a variety of materials, the most popular of which is mica. My improvement, however, may be applied to diaphragms other than those of mica. The object of the improvement is to attain a greater degree of uniformity of vibration and in the case of mica to overcome the tendency of the flakes or layers to separate and move one upon another. I there-

fore coat the diaphragm with a suitable paint or sticky substance, such as the varnish above suggested, and impress upon the wet surface a disk of thin paper, or thin woven fabric, such as silk, and maintain the parts under pressure until there is an intimate union of them. This is shown in the drawing where 20 may be taken to indicate a coating of adhesive material and 21 the facing of paper or fabric.

The manner in which the diaphragm is mounted in the head or sound box is shown in Fig. 2. On each side of the diaphragm adjacent its edge is a circular gasket 22 composed of a central core of wire and a surrounding closely adhering coating of insulating material formed or molded upon the wire. These gaskets are seated against the wall of the head and the diaphragm is clamped between them. Back of the circular gaskets is a filling of adhesive plastic compound 23 and the parts are drawn up tight by any appropriate means. To further exclude undesirable vibrations from the diaphragm, I have in a measure controlled the extra or local node vibrations of the vibrating arm and experience has shown an improvement in the result. To this end the vibrating arm is covered with a layer of adhesive material, such as paint, or asphaltum varnish, and the result sought may be enhanced by wrapping upon this coating, while still wet, a strip of thin fabric, such as silk, indicated by 7'. A further feature of construction, designed to improve the quality of reproduced tones, is shown in detail in Fig. 2, wherein is shown a tube 28 extending from within the neck into close juxtaposition to the diaphragm. The tube, when adjusted, may be secured by a suitable adhesive. The proximity of the inner end of the tube 28 to the surface of the diaphragm should be such as to permit the greatest amplitude of vibration of the diaphragm without contact with the tube. Aside from this, the adjustment may be that best suited to the particular instrument. I have found very highly satisfactory results when the adjustment is such that the space between the face of the diaphragm and the end of the tube is sufficient, and practically no more, to permit the greatest range of vibration of the diaphragm. I have also demonstrated that if the tube 28 is made of rubber, meaning by that term "semi-hard" rubber, admirable results in the way of improved quality of tone are afforded. The tube may, however, be of hard rubber or of other materials including metal.

A further feature of this invention is

that if the mass 11 in the container 10 is of such character as to form a stable permanent support at room temperature, and will on application of heat be softened, there is thereby afforded a very admirable mode of adjusting the vibrating arm with the utmost nicety as follows: When the arm is attached to the diaphragm and the projection therefrom seated in the vibration absorbing mass, if the adjustment is not such that the diaphragm remains in its normal flat plane without undue stress in either direction, application of heat to the container will render its contents sufficiently plastic to permit of adjustment of the support by the minutest shades of change. Thus a perfect condition may be established that becomes permanent when the plastic mass has set.

A suitable compound for the purposes above stated consists of one part by weight of Stockholm tar, one part by weight of resin and three parts by weight of gutta-percha.

In my application for Patent No. 867,709, filed Oct. 21, 1914, I have claimed a method herein generally described of connecting certain parts of the reproducing mechanism of a talking machine, and in my application No. 867,710, filed Oct. 21, 1914 I have claimed a construction involving a support for the stylus arm, comprising a flexible metallic part embedded in a yielding meltable mass.

I claim:

1. In a talking machine a diaphragm mounted between gaskets composed of non-stretchable central cores of wire and closely adhering insulating material molded thereon.

2. In a talking machine, a diaphragm, a supporting frame therefor and a retaining gasket consisting of a non-stretchable core of relatively hard material and closely adhering insulating material molded thereon.

3. In a talking machine the combination with a sound box the inner faces of which are coated with a dampening material, a diaphragm mounted therein and also coated with a dampening material, a vibrating arm attached to the diaphragm and coated with a dampening material, and a support for the vibrating arm mounted in a mass inert to vibrations.

In testimony whereof, I have hereunto subscribed my name.

PATRICK B. DELANY.

Witnesses:

L. L. BROWNING,
LAURA E. SMITH.

TALKING MACHINE RECORDER AND REPRODUCER,
#1,190,636-----P. B. Delany,
Patented-July 11th, 1916.
Filed-July 19th, 1913.

P. B. DELANY.
TALKING MACHINE RECORDER AND REPRODUCER.
APPLICATION FILED JULY 19, 1913.

1,190,636.

Patented July 11, 1916.

Fig. 1.

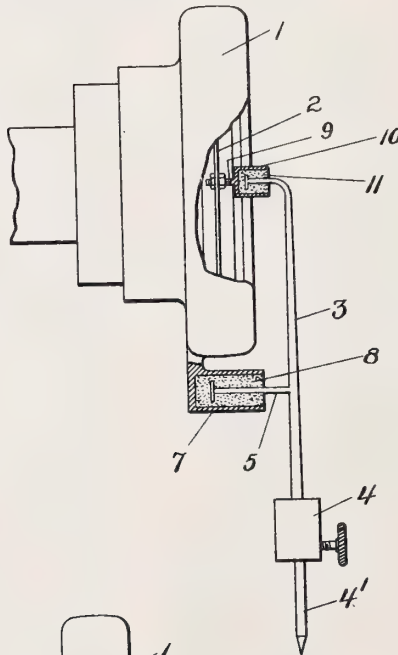
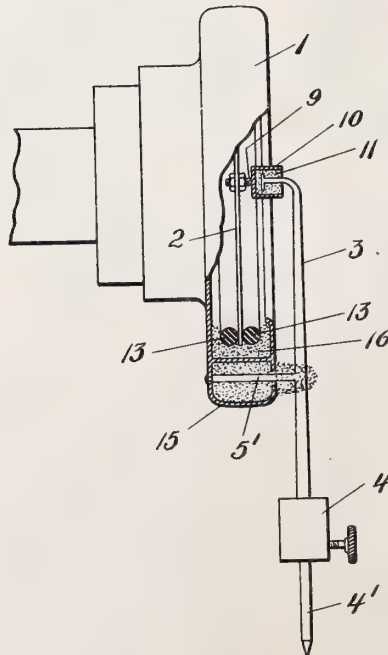


Fig. 2.



Witnesses:
L. F. Browning
R. C. Smith

Inventor
Patrick B. Delany
By his Attorney
Edward C. Davis

UNITED STATES PATENT OFFICE.

PATRICK B. DELANY, OF SOUTH ORANGE, NEW JERSEY.

TALKING-MACHINE RECORDER AND REPRODUCER.

1,190,636.

Specification of Letters Patent.

Patented July 11, 1916.

Application filed July 19, 1913. Serial No. 779,947.

To all whom it may concern:

Be it known that I, PATRICK B. DELANY, a citizen of the United States, residing at South Orange, county of Essex, State of New Jersey, have invented an Improvement in Talking-Machine Recorders and Reproducers, of which the following is a specification.

This invention is designed to eliminate scratching or scraping noise from the record and to so improve the quality of recordings and reproductions. It is well known that even the smoothest surface revolving under the needle will produce quite a loud or observable noise emitted by the horn or amplifier. It has been found that this is largely due to the metallic vibrating arm connecting the record and the diaphragm of the sound box. Vibrating arms of wood, bone or any hard substance will produce this effect to a modified degree. It has been sought to remedy such defect by rubber and other vibration deadening materials interposed at the point of contact between the vibrating arm and the diaphragm, but on account of the elasticity of such materials, or for other reasons, the tone of reproduction has been greatly lowered and modified and, owing to the instability of such materials, particularly under pressure, the instruments soon become out of adjustment or order. I have devised a plan whereby metallic connection between the record and diaphragm is entirely severed without appreciable loss of force but with marked suppression of the objectionable scraping sound, the result being a pure and faithful reproduction.

The object of this invention is attained by dividing the vibrating arm, preferably between the diaphragm and the bend in the upper part of the arm, and seating or embedding the adjacent ends in a mass of material of suitable density and stability to carry the major or sound producing vibrations, and yet of such character as to suppress or eliminate objectionable extraneous, incidental and minor vibrations that produce the extraneous or scraping sounds in the tones produced by the diaphragm. The material of such mass may be a single material or a compound material composed, for instance, of rubber, asphaltum, tar, waxes of various kinds, etc., or compounds of any two or more of such simple materials.

The invention further comprises features hereinafter set forth.

In the accompanying drawing, Figure 1 is an elevation partly in section; and Fig. 2 a like view showing a modification.

1 indicates the sound box, 2 the diaphragm, 3 the vibrating arm, 4 the needle holder, and 4' the needle. The arm has a lateral bar or rod 5 with a cross head thereon (Fig. 1) seated, embedded or surrounded by a mass 8 of material, such generally as hereinbefore described that absorbs, eliminates or suppresses secondary or minor objectionable vibrations, and is contained in a cup or container 7 attached to or integral with an extension from the sound box. Such a manner of mounting the vibrating arm is disclosed in my application Serial No. 700,394, filed May 29, 1912. The upper portion of the vibrating arm is divided transversely. The end portion 9 is attached to the diaphragm in any ordinary or suitable way and the adjacent ends of the arm are mechanically united by means of a mass of compound 11 that fills a container 10 carried by the end portion 9 of the arm, and in which the adjacent portion of the vibrating arm is embedded. Interruption of the continuity of the arm by a body of material acting to suppress or eliminate minor undesirable vibrations therein affords marked improvement in character or quality and purity of tone.

The material, mass or compound used in the practice of this invention is by preference one that becomes soft and even viscous or semi-liquid under the influence of a suitable degree of heat, and which at ordinary temperatures—room temperatures—becomes and remains "hard", meaning by that sufficiently rigid or stable to follow the primary vibrations of the arm. This arrangement permits of firm attachment of the last section of the arm to the diaphragm and, what is of great importance, while said mass is yet in a plastic state in the process of cooling or setting the part attached to the diaphragm and the part attached to the support are allowed to assume positions in the connecting masses controlled by the normal position of the diaphragm in its mounting and of the support in its anchorage so that there is no warped or biased strain, a condition practically unavoidable in prior constructions. If, when the different parts are connected, or upon

completion of the different mountings, the sound box as a whole be placed for a short time in a temperature sufficient to soften the mass in which the diaphragm is attached to its gaskets and the recessed portion of the case in which they are held; the mass in the container in which the arm support is anchored, and the mass in the container comprising the coupling of the parts of the arm, all the parts will yield to a position of unbiased coördination and establish a true and highly sensitive vibrating system. This equalization of strain between the different mountings of the diaphragm, its vibrating arm and severed parts under action of heat forms an important feature of my invention.

Fig. 2 shows the diaphragm holding gaskets 13, 13 and the compound 16, in which they, as well as the diaphragm, are partially embedded. Here the container marked 15 is located on or attached to the periphery of the sound box and is filled with a compound having the characteristics above described. The supporting rod for the vibrating arm is here marked 5¹ and extends entirely through the compound and is secured to the bottom wall of the container, which is in this particular construction a continuation of the wall of the sound box. A further feature shown in Fig. 2 is that the rod 5¹ extending from the container 15 is coated with the compound which extends also over and around the juncture of the rod with the body of the vibrating arm 3. This latter arrangement is one shown by experience to aid in the production of pure tones.

The material or compound employed is one that is non-vibratory in that it does not respond to or transmit through itself (at least to objectionable extent) vibrations set up in the arm.

In my copending application for Patent No. 867,709, filed Oct. 21, 1914, I have claimed a method herein generally described of connecting certain parts of the reproducing mechanism of a talking machine, and in my application for Patent No. 867,710, filed Oct. 21, 1914, I have made claims to a construction involving a support for the stylus arm which is rigidly attached to said arm and is connected to the head in which the diaphragm is mounted, a fixed plastic

mass of material inert to vibrations being arranged to embrace the sides of the support. I have also made claims in said application No. 867,710, to a construction in which means is provided which acts upon the juncture of the stylus arm and its support to deaden or absorb the vibrations of said stylus arm, and also to a construction in which the actuating member of the diaphragm is provided with a support comprising a flexible metallic part and a yielding meltable mass in which said metallic part is embedded.

I claim:

1. In a talking machine sound box, a vibrating arm severed intermediate the part contacting with the record and the diaphragm, said severed parts being joined by a meltable non-vibratory material.

2. In a talking machine sound box, a vibrating arm in two parts, one part attached to the diaphragm the other part mounted on a support and a non-vibratory connection between the two parts composed of a meltable mass.

3. In a talking machine sound box a vibrating arm, a support for said arm and a meltable mass surrounding said support, and the juncture of said support with said arm.

4. In a talking machine sound box provided with a diaphragm, a support, a vibrating arm in two parts, one part attached to the diaphragm and the other part attached to said support, a meltable non-vibratory connection between the two parts, and a meltable non-vibratory mounting for the support.

5. The combination of a diaphragm, its supporting frame, a vibrating needle-supporting arm, means for supporting said vibrating arm, a container attached to the diaphragm and into which one end of said vibrating arm extends, and a meltable mass of non-vibratory material in the container surrounding the end of the vibrating arm therein.

In testimony whereof, I have hereunto subscribed my name.

PATRICK B. DELANY.

Witnesses:

EMMA COOK,
LAURISTON BUNKER.

PHONOGRAPH,

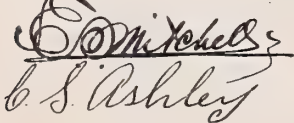
#1,190,673-----C.B.Repp,

Patented-July 11th, 1916.

Filed-Aug. 12th, 1909.

APPLICATION FILED AUG. 12, 1909.

Patented July 11, 1916.



Clinton B. Repp Inventor:
by Frank J. Wentworth
his Atty

UNITED STATES PATENT OFFICE.

CLINTON B. REPP, OF NEW YORK, N. Y.

PHONOGRAPH.

1,190,673.

Specification of Letters Patent.

Patented July 11, 1916.

Application filed August 12, 1909. Serial No. 512,552.

To all whom it may concern:

Be it known that I, CLINTON B. REPP, a citizen of the United States, residing at the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Phonographs, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to phonographs and more particularly to a type thereof commonly known as "hornless" phonographs.

In phonographs of the hornless type, whether such be phonographs or gramophones, the resonator or horn is ordinarily inclosed in the inner casing below the works which casing merely conceals the horn, thus making the term "hornless" in reality a misnomer. The position of the horn, however, necessitates the projection of the sound waves, reproduced by the diaphragm, downwardly into the mouth of said horn, or against the said resonator. In gramophones but little difficulty has been experienced in projecting these sound waves as described, owing to the lateral undulations of the indentations upon the records, and the fact that the horn has a swiveling relation permitting the sound box and the reproducer point thereof, to follow the trend of the said indentations. With a graphophone, however, it has heretofore been found impractical to so project the sound waves, owing to the peculiar structure of the machine, which ordinarily involves a laterally moving sound box caused to traverse the record in a straight line parallel to the axis of rotating of the record by means of a feed screw, the pitch of which conforms to that of the indentations on the record.

In my present invention the primary aim is to provide an apparatus or mechanism transmitting the sound vibration from a reproducer point carried by a swiveling arm, to a diaphragm mounted within a stationary sound box, the outlet of which sound box will be presented downwardly so as to project the sound waves formed by the diaphragm, downwardly into the mouth of the resonator or horn. As an essential to this construction, the diaphragm, in order to reproduce sound in sufficient volume to be of practical use, must be placed under tension and the vibrations must be transmitted thereto through a substance adapted to

transmit such vibrations. As the diaphragm will ordinarily be tensioned by pressure applied in a direction opposite to the line of projection of the sound waves, and the reproducer point will be pressed upon the record in the same direction as the line of projection of said waves, it is apparent that a member must be interposed between the arm carrying the reproducer point and the diaphragm, through which the vibrations will pass from the said arm to said diaphragm and that this interposed member must be so constructed and arranged as to transmit such vibrations and at the same time place the diaphragm under tension.

Hence a further object of the invention is to provide a phonograph embodying therein a stationary sound box, a swiveling arm carrying the reproducer point, a member interposed between said arm and said diaphragm and means placing said diaphragm, and the means connecting said interposed member with said arm and with said diaphragm under tension to impart such tenseness to the mechanism transmitting the sound vibrations as well as to the diaphragm, as will make the entire transmission and reproducing mechanism highly sensitive, thus insuring accuracy of reproductions and richness or fullness of tone without the accompanying false tones or blasts due to cross vibrations in such mechanism, as vibrations not solely dependent upon the indentations of the record.

A still further object is to provide a phonograph wherein the arm carrying the reproducer point will be subjected to that pressure necessary to bring the point into the necessary intimate contact with the indentations in the record, and the direction of such pressure will be reversed as to the diaphragm, preserving, however the tension throughout the transmitting mechanism, and avoiding the presence of vibratory members in a relation where they will transmit cross vibrations to the diaphragm.

A still further object is to provide a phonograph embodying therein a stationary sound box, and a swiveling arm carrying the reproducer point mounted on bearings eccentrically disposed as to the sound box, the vibrations passing along which arm will be transmitted to a second vibratory arm mounted in bearings having a fixed relation to the sound box, thus both tensioning the diaphragm, and transmitting sound vibra-

tions thereto through an interposed member having no swiveling or oscillatory action.

A still further object is to provide a phonograph wherein the sound box will be fixed, and the sound vibrations will be transmitted thereto by a plurality of enchain-
 5 members, one of which is capable of swiveling, and all of which are in tension with each other and the diaphragm, and wherein
 10 the means pressing the reproducer point upon the record, and the means placing the transmitting mechanism and the diaphragm under tension will be an external force ap-
 15 plied from the axis of rotation of the said swiveling member, to insure the accurate feeding of the member carrying the repro-
 ducer point under the control of the spiral indentations of the record.

A still further object is to provide a phonograph, the reproducer mechanism of which will automatically adapt itself to any pitch of the spiral indentations of the record and the reproducer point will be so
 25 constructed and mounted as to be readily readjusted to adapt it to different pitches of records without impairing the quality of the tones reproduced.

A still further object is to provide a phonograph of the hornless type, wherein the main horn or sound resonator will be made of wood, and the connection between said
 30 horn and the sound box will be such as to make the assembling of the device convenient, and also to secure that rigidity of parts desirable to prevent cross vibrations or
 35 blasts in the horn. And a still further object is to provide a phonograph the transmission mechanism of which will be adapted for use with a hornless phonograph, of
 40 the graphophone type.

The invention consists broadly in a phonograph embodying therein a fixed sound box having a diaphragm therein, a swivel-
 45 ing arm carrying a reproducer point, a vibrator member one end of which is connected to said swiveling arm at the axis of rotation thereof and the other end of which is connected to said diaphragm, and means
 50 applying pressure to said interposed member through said swiveling arm at the axis of rotation thereof, whereby said diaphragm and said connections will be tensioned; and in such other novel features of construction
 55 and combination of parts as are hereinafter set forth and described and more particularly pointed out in the claims hereto appended.

Referring to the drawings: Figure 1 is a plan view of a phonograph embodying my invention; Fig. 2 is a side elevation thereof with a portion of the case broken away to disclose the constructions of the concealed
 60 horn or resonator; Fig. 3 is a view on an enlarged scale of the sound box and its ap-
 65

purtenances including the members of the transmitting mechanism disposed between the swiveling arm and diaphragm, the said sound box and diaphragm being shown in vertical section, and Fig. 4 is a detailed view
 70 on a larger scale of the fitting for the adjustable reproducer point carried by the swiveling vibrating arm.

Like letters refer to like parts throughout the several views.

In the embodiment of my invention shown in the accompanying drawings, *a* indicates the phonograph casing within which is concealed a horn of any desired construction.
 75 In the drawings, this horn is shown as being composed of a wooden trumpet *b*, having an inlet formed in a rectangular block *c*. The trumpet *b* extends horizontally and the opening in the block *c* extends in a
 80 curve from the horizontal, to the vertical, for the purpose of receiving and directing downwardly projected sound waves from the diaphragm to the said trumpet. Se-
 85 cured to the top of the block *c* is a metallic trumpet section *d*, the upper end of which is adapted to receive the downwardly projected nipple *e*, of the sound box *f* and the lower end of which is firmly secured by the
 90 said block *c* by means of flange *d'* made integral with the section *d*, and screws clamping said flange firmly upon said block. By
 95 this construction sound waves emanating from the diaphragm in the sound box are projected downwardly to the trumpet *d* through the channel in the block *c* in a man-
 100 ner to avoid the development of any cross vibrations in the horn mechanism, the rigidity of the horn structure throughout contributing to this result.

Mounted on the top of the case *a* is a
 105 metallic plate *g*, encircling the trumpet section *d* and having an extension *g'* projecting radially of the section *d* and perpendicular to the axis of rotation of the mandrel
 110 *h* carrying the record, which extension carries a vertical stud *i* forming the lower center about which, the swiveling vibrator arm
 115 *j* rotates in following the spiral indentations or indicated sound waves of the record. The stud *i* carries fastening means, as the hook *i'*, to which one end of the elastic
 120 means exerting that pressure necessary to force the reproducer point into engagement with the record, and place the diaphragm under constant tension, is secured.

The sound box *f* is supported horizontally above the section *d* in any desired manner, as by the uprights *g²* carried by the plate *g*, with the outlet nipple or nozzle *e* fitting
 125 closely upon and opening with said section. This sound box may be of any desired construction embodying a diaphragm *k* of sufficient strength to withstand the constant tension under which it is placed by the elastic
 130 means hereinafter referred to and that vari-

able tension due to the rapid vibration thereof as the vibratory waves are transmitted thereto through the transmission mechanism from the reproducer point and the record.

5 A mica diaphragm, is preferable, but any other suitable material may be used. The edges of the diaphragm *k* are secured between soft rubber packing rings *m—m'* as shown, in the usual manner, said rings being
10 clamped upon said diaphragm by the ring *n*.

The outlet to the sound box being presented downwardly as above described, it is apparent that to avoid the presence of objects within the horn and the course of the
15 sound waves reproduced by the diaphragm, it is essential that the sound vibrations be transmitted to said diaphragm from above, and that the pressure tensioning said diaphragm be also applied from above. It being
20 essential to a commercially operative phonograph that these sound vibrations be conducted by a continuous vibratory mechanism, directly to the diaphragm, to secure the proper volume of tone in the reproduction, and it also being desirable to eliminate
25 all vibratory parts about the diaphragm, excepting those utilized in transmitting the vibrations thereto, I have provided a special form of transmitting mechanism consisting of a plurality of enchained members all of
30 which, not only will be under the same constant tension, but will also place the diaphragm under tension by a reversal of the direction of the pressure applied to said mechanism. This arrangement insures the
35 accurate transmission of vibrations from the reproducer point to the diaphragm, and the elimination of all weak vibrations due to imperfection in the record or in the reproducer point, and the resultant "scratching" or "blasts" attributable thereto. While this
40 constant tension makes the transmission mechanism sensitive, nevertheless, it has been demonstrated that the reproduced sounds are clear, rich and full when the diaphragm and the transmission mechanism, are thus
45 under a heavy tension; and that they become thin and irregular when the tension is too high, and weak and muffled when the tension is removed. This I attribute to a
50 probability that with the proper tension, the vibrations pass sharply through the transmission members which respond readily and evenly thereto, to the diaphragm which vibrates regularly, rapidly and evenly while
55 such vibrations continue, and cease to vibrate instantly with the cessation of vibration in the transmission mechanism.

The transmission mechanism above referred to comprises in addition to the swiveling arm *j*, a vibrator member *o* mounted by means of horizontal pivots, in a suitable
60 bracket *n'* carried by the ring *n*. The said pivots while permitting a free vertical reciprocation of the member *o*, should have a

fairly tight fit with their bearings in said bracket to prevent the rattling thereof due to a lateral movement of said member. The opposite ends of the member *o* have holes
70 therethrough through which are passed flexible connections *o' o²*, preferably waxed cord, by means of which said arm is connected at its opposite ends to the swiveling arm *j* and the headed stud *p* passed through and engaging the diaphragm *k*. The connections
75 *o' o²* are preferably formed in a continuous loop, permitting the inner ends of the vibrator arm *j* to swivel freely relative to said interposed member *o*. The connection *o²* is
80 connected to the member *o* at a point directly above the stud *i*, these two points being alined with the vertical axis of rotation of said arm.

The swiveling vibrator arm *j* is of wood, preferably a close straight grained wood
85 such as bass-wood, and the opposite ends thereof have mounted therein the reproducer point, and means cooperating with the connection *o²* for preserving physical continuity of the transmission mechanism preferably a
90 hook *j'* adapted to pass through the loop *o²*. Engaging the hook *j'* and exerting a downward pressure upon the outer arm of the interposed member *o*, and therethrough upon
95 the loop *o²*, is a spring *p'*, the lower end of which is secured to the hook *i'* of the stud *i*. The size of the hook *i'* and of the cooperating loop of the spring *p*, permits the arm *j* to turn freely upon the cord *o²*. This downward
100 pressure upon the outer arm of the interposed member *o* is reversed as to the inner arm thereof, which exerts a corresponding upward pressure upon the diaphragm *k*,
105 through the cord *o'*, thus tensioning both said diaphragm and said cord. It will thus be observed that the entire transmission
110 mechanism is in tension and that the various enchained elements are in physical contact with each other so as to permit a direct conduction of the vibration from one element to the other.

Preferably the pivots of the member *o* are arranged centrally thereof to equalize the tension on the various parts.

Extending from the stud *i* to a point adjacent to the outer end of the arm *j* is a
115 spring *q*, the function of which is to draw the reproducer point firmly upon the record to secure the desired intimate engagement of said point with the undulations or indicated
120 sound vibrations of the record. The inner end of this spring *q* being in alignment with the vertical axis of rotation of the arm *j*, said arm is permitted to rotate freely notwithstanding this means forcing
125 same downwardly. The various springs acting on the arm *j* and therethrough upon other members of the transmission mechanism and the diaphragm, all converge to a point directly below the outer end of said
130

arm *o*, thus permitting said vibrator arm *j* to rotate about an axis arranged eccentrically of the diaphragm, while permitting said diaphragm to be tensioned by an upward pressure acting centrally thereof.

The vibrator arm *j* being free to swivel as described, the spiral trend of the indentations of the record will cause the reproducer point to be automatically fed by the mere rotation of the record on the mandrel *h*. A merely conventional showing of the mandrel and its driving mechanism is made in the drawings, and no detailed description thereof is entered into; as such are immaterial to the invention, any suitable record support and actuating mechanism therefor, being adapted for use with my invention.

Inasmuch as the automatic feeding of the reproducer point carrier permits the point to be fed by the record, I provide a mount for said point and a special type of point for use in said mount, to adapt a single arm to records having different pitches. The mount consists of a metallic stud *r* having a screw threaded shank *r'* by means of which it may be firmly attached to the end of the arm *j*. I drill a hole *s* vertically through this stud and drill a countersink *s'* above said drill hole. Adapted to be seated in the hole *s* and countersink *s'* is a pin *t* having a central flange *t'* adapted to rest upon the bottom of the countersink. The opposite ends of this pin are adapted to have mounted therein the ordinary reproducer point, the points mounted in the opposite ends being differently shaped to permit them to engage the undulations in the bottom of the indentations in records having either 100 or 200 pitch. Passing through the end of the stud *r* is a set screw *u* adapted to engage the flange *t'* and lock said pin on its seat. It will thus be observed that the point may be readily reversed to adapt a machine to differently pitched records.

The operation of my improved phonograph is apparent from the foregoing description. Sound vibrations imparted to the arm *j* by the record through the reproducer point are conducted along this arm, to the arm *o* interposed between it and the diaphragm through the flexible link *o'*, and to the diaphragm by said arm *o* through the flexible link *o''*, this transmission being through enchainment members having physical contact one with the other, and all being under such tension as to readily conduct and transmit such vibrations. Owing to the necessity for the first of these enchainment members following the record, this member has a swiveling relation to the conducting member or members disposed between it and the diaphragm, these latter being in stationary relation to the diaphragm, thus

avoiding any such looseness of parts as would tend to cause rattling, cross vibrations, or blasts.

The arrangement of the tensioning means is such as to tension the diaphragm by a reversal of the direction of the pressure applied to the conductor mechanism and without impairing or interfering in any way with the vibrations passing therethrough.

It is not my intention to claim broadly a swiveling conductive arm, nor a diaphragm under a constant tension, in this application, my present invention relating more particularly to those features incidental to projecting the sound waves downwardly, and to adapting the hornless phonograph to cylinder machines or graphophones. Nevertheless, it is not my intention to limit my invention to the precise details of construction shown in the drawings as it is apparent that such may be varied to adapt the invention to phonographs of different design without departing from the spirit and scope of the invention.

I believe it to be new to conduct sound vibrations along a swiveling member to a stationary diaphragm through an interposed vibratory member and I intend to claim such broadly.

Having described my invention, what I claim as new and desire to have protected by Letters Patent is:—

1. In a phonograph, a fixed sound box having a downwardly presented sound outlet opening, a diaphragm therein, a vibrator member having a fixed relation to said sound box, one end of said member projecting over said diaphragm, and the other end thereof projecting beyond said sound box, a vibrator member adapted to be impelled across a record, connections between said last named vibrator member and the end of said first named vibrator member extending beyond said sound box and between the other end of said first named vibrator member and said diaphragm, whereby sound vibrations are transmitted through said connections from one of said vibrator members to the other, and therethrough to the diaphragm, and means acting to simultaneously tension said diaphragm and said connections between said first named vibrator member, said diaphragm, and said other vibrator member.

2. In a phonograph, a sound box, a diaphragm therein, a vibrator member adapted to be impelled across a record, a vibrator member having a fixed relation to said diaphragm, connecting means between said vibrator members whereby sound vibrations are transmitted from one to the other, connecting means between said last named vibrator member and the diaphragm whereby sound vibrations transmitted thereto are transmitted to the diaphragm, and means

acting on said diaphragm through said connecting means and said last named vibrator member to tension said diaphragm, said last named means having constant uniform
 5 action to tension said diaphragm in a direction opposite to the direction of movement of the sound vibrations in passing to said diaphragm.

3. In a phonograph, a sound box having
 10 a downwardly projected sound outlet, a concealed horn or resonator communicating with said outlet, a diaphragm in said sound box, a vibratory member carrying a reproducer point mounted to rotate about an axis
 15 parallel to the axis of said diaphragm and eccentrically thereof, means applying a downward pressure upon said vibrator member, and interposed members between said vibrator member and said diaphragm
 20 whereby said pressure is reversed in direction as to said diaphragm, and said diaphragm and said interposed members are placed under tension.

4. In a phonograph, a sound box having
 25 a downwardly projected sound outlet, a concealed horn or resonator communicating with said outlet, a diaphragm in said sound box, a vibratory member carrying a reproducer point mounted to rotate about an axis
 30 parallel to the axis of said diaphragm and eccentrically thereof, a vibratory arm mounted in horizontal bearings fixed relatively to said diaphragm, flexible connections between the opposite ends of said last
 35 mentioned arms and said diaphragm and said first mentioned vibratory member, and an elastic member acting upon said first mentioned vibratory member directly below the flexible connections between the same
 40 and said fixed vibratory member whereby said connections and said diaphragm are placed under a constant tension, and said first mentioned vibratory member is permitted to swivel relatively to said second
 45 vibratory member to follow the spiral indentations in the record.

5. In a phonograph, a sound box having a downwardly projected sound outlet, a concealed horn or resonator communicating
 50 with said outlet, a diaphragm in said sound box, a vibratory member carrying a reproducer point mounted to rotate about an axis parallel to the axis of said diaphragm and eccentrically thereof, a vibratory arm
 55 mounted in horizontal bearings fixed relatively to said diaphragm, flexible connections between the opposite ends of said last mentioned arm and said diaphragm and said first mentioned vibratory member, and a

helical spring acting upon said first mentioned vibratory member directly below the
 60 flexible connections between the same and said fixed vibratory member whereby said connections and said diaphragm are placed under a constant tension, and said first mentioned vibratory member is permitted to
 65 swivel relatively to said second vibratory member to follow the spiral indentations in the record.

6. In a phonograph, a sound box having
 70 a downwardly projected sound outlet, a concealed horn or resonator communicating with said outlet, a diaphragm in said sound box, a vibratory member carrying a reproducer point mounted to rotate about an axis
 75 parallel to the axis of said diaphragm and eccentrically thereof, a vibratory arm mounted in horizontal bearings fixed relatively to said diaphragm, flexible connections between the opposite ends of said last
 80 mentioned arm and diaphragm and said first mentioned vibratory member, and a helical spring acting upon said first mentioned vibratory member directly below the flexible connections between the same and
 85 said fixed vibratory member whereby said connections and said diaphragm are placed under a constant tension, and said first mentioned vibratory member is permitted to
 90 swivel relatively to said second vibratory member to follow the spiral indentations in the record, and a spring extending from said first mentioned vibratory arm to the point of attachment of said first mentioned
 95 spring whereby the reproducer point is pressed upon the record.

7. In a phonograph, the combination with a stationary diaphragm and a swiveling vibratory arm of a mount consisting of a block carried by said arm having a vertical opening extending therethrough, said opening
 100 being stepped to provide a seat therein, a screw thread whereby said mount may be firmly secured to said arm, a pin the opposite ends of which carry reproducer points adapted to register with records differing
 105 in pitch, a flange intermediate said points adapted to rest upon said seat and a set screw for clamping said flange within said opening.

In witness whereof, I have hereunto af-
 110 fixed my signature, in the presence of two witnesses, this 10th day of August, 1909.

CLINTON B. REPP.

Witnesses:

F. T. WENTWORTH,
 P. FRANK SONNEK.

GRAPHOPHONE PATENT.

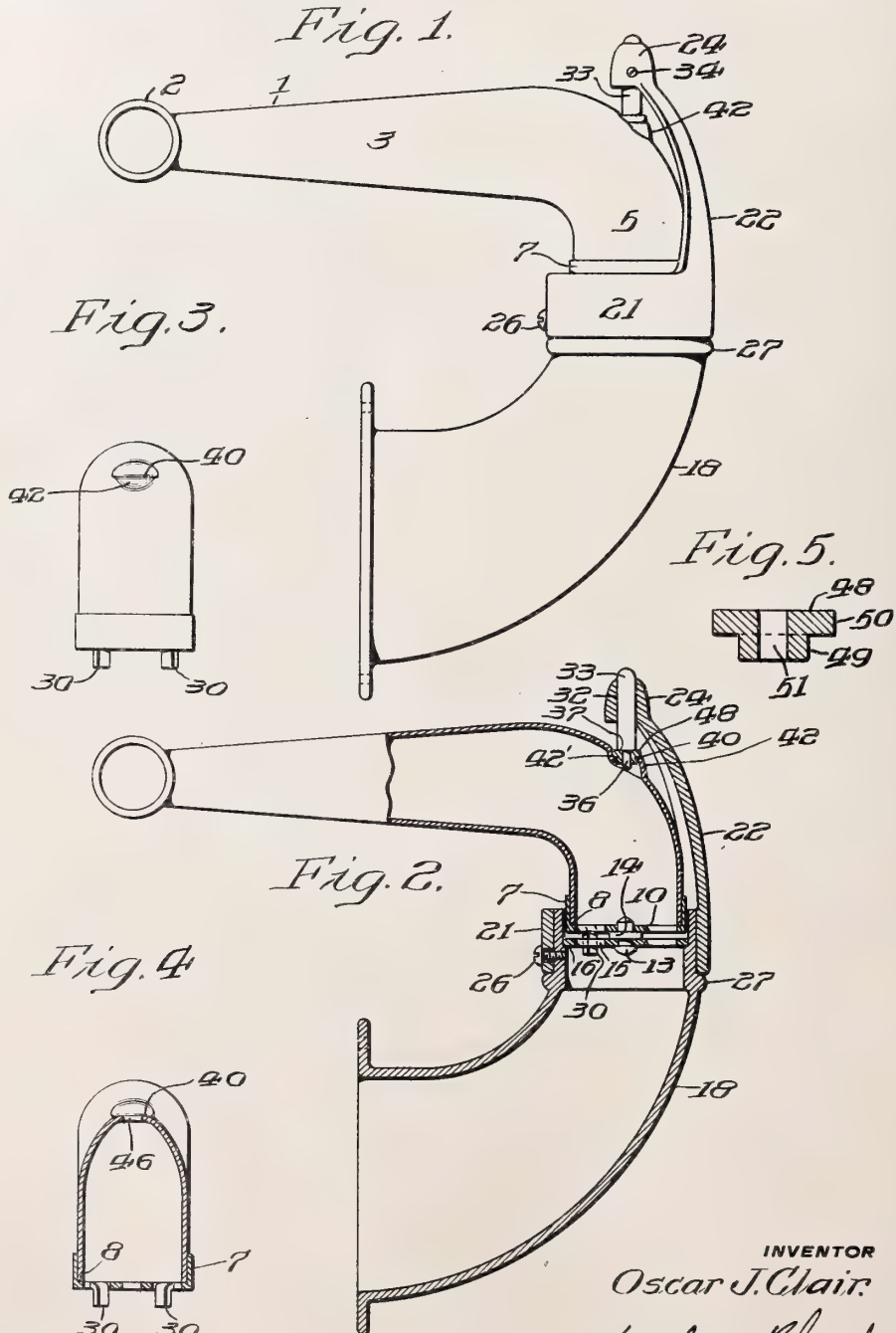
518703

 TONE ARM FOR TALKING MACHINES AND THE LIKE,
#1,190,728-----O. J. Clair,
 Patented-July 11th, 1916.
 Filed-March 31st, 1915.

G. J. CLAIR.
TONE-ARM FOR TALKING MACHINES AND THE LIKE.
APPLICATION FILED MAR. 31, 1915.

1,190,728.

Patented July 11, 1916.



WITNESSES
W. J. Hartman.
George A. Helbert

BY

INVENTOR
Oscar J. Clair.

Frator & Blount.

ATTORNEYS

UNITED STATES PATENT OFFICE.

OSCAR J. CLAIR, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TONE-ARM FOR TALKING-MACHINES AND THE LIKE.

1,190,728.

Specification of Letters Patent.

Patented July 11, 1916.

Application filed March 31, 1915. Serial No. 18,276.

To all whom it may concern:

Be it known that I, OSCAR J. CLAIR, a citizen of the United States, and a resident of Camden, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Tone-Arms for Talking-Machines and the like, of which the following is a specification, reference being had to the accompanying drawing.

In the construction of talking machines, it is generally customary to provide the same with tone arms, frequently of the tapering type, to the outer or free end of which is suitably attached the sound box or other reproducing means, the inner end of the tone arm, which in the tapering variety of arm is also the large end, being adapted to communicate with the horn or other amplifying means employed.

To permit of the free movement of the tone arm across the surface of the sound record, it is not unusual to mount the elbow thereof at the end communicating with the horn, bracket or other sound amplifying means upon a vertical spindle extending from said fixed end longitudinally through the elbow and suitably mounted in a fixed relation with the casing or other stationary part of the talking machine.

Tone arms are generally constructed with a substantially right angled bend or elbow adjacent that end thereof which communicates with the horn or other sound amplifying means, and a hole is usually provided through the outer surface of the elbow for the reception of such spindle. A suitable lug or similar projection is usually soldered or brazed on the exterior surface of the elbow at the point where the said hole is to be, in order to provide a thickness of metal at said point sufficient to form an adequate bearing for said spindle. As the spindle usually extends through this opening and throughout the length of the elbow from said opening to the end of the arm communicating with the sound reproducing means, unless most carefully constructed there is liable to be a slight play or looseness between the spindle bearings therefor, with the result that the tone arm is set into a state of vibration during the reproduction of sound thereby causing an undesirable rattle or buzzing. In such constructions as have been above referred to it is also difficult to properly position the lower end of the spin-

dle into the opening therefor in the upper end of the bracket or support when once the spindle has been withdrawn or removed for any purpose.

The principal objects of my invention are to do away with the necessity for the employment of such a spindle and to so modify the shape of the tone arm itself as to provide a suitable substantially flat bearing surface or shoulder integral with the arm itself to coöperate with one of a pair of short pivotal studs which do not extend into or through the elbow.

Other objects of my invention are to provide a construction in which the two separated or spaced studs may be readily adjusted toward and away from each other to provide for a snug engagement between the tone arm and the studs upon which it is mounted to swing with a view of preventing any jarring or rattling of the parts during the reproduction of sound.

Other objects of my invention are to provide a tone arm which shall be neat in appearance and inexpensive to construct, and which shall do away with the necessity of soldering or otherwise securing an unsightly external projection upon the outer curved surface of the elbow and which is liable to detract from the smooth, symmetrical appearance of the elbow. Further objects of my invention are to reduce the cost of manufacturing tone arms; to provide a tone arm in which the spindle is eliminated having a bearing which shall be substantially, and for all practical purposes, integral therewith, and which shall not be liable to separate therefrom through rough usage or careless handling.

Still further objects of my invention are to provide an improved mounting for the tone arm which shall permit of the free movement of the tone arm in a horizontal plane, while preventing any movement of the tone arm in a vertical direction; which may be readily assembled or disassembled, and in which the tone arm may be easily and quickly removed or replaced without the use of special tools.

My invention further includes all of the other novel features of construction and arrangement hereinafter more definitely specified.

In the accompanying drawing Figure 1 is a side elevation of a tone arm constructed

in accordance with my invention and in operative position upon its hollow supporting bracket, the latter being removed from a talking machine, and Fig. 2 is a central vertical section of a tone arm and bracket similar to that shown in Fig. 1; Fig. 3 is an end elevation of the tone arm removed from the supporting bracket; Fig. 4 is a similar view thereof partially in central vertical section, the section being taken along the axial line of that portion of the tone arm communicating with the sound amplifying means, and Fig. 5 is an enlarged view of a detail of the device in central vertical section.

Referring now to the drawing, the tone arm 1, which may preferably be of the tapering type, having at its smaller end a transverse cylindrical tube 2 adapted for the reception of means whereby the tone arm is connected to the sound box, (not shown), may be said to consist of a substantially horizontal portion 3, and a downwardly turned portion 5. The downwardly turned portion 5 of the arm may preferably be provided adjacent its lower end with a surrounding collar 7, brazed or otherwise suitably secured to its exterior, the collar being preferably provided on its interior with an inwardly projecting annular shoulder 8, adapted for the reception of the end of the tone arm which abuts upon its shoulder, thus forming a neat finish at the end of the tone arm. A bridge 10, preferably formed integral with the collar, extends across the mouth of the tone arm and is preferably somewhat enlarged at its center to provide a suitable aperture for the reception of the stud 13, having a flange 14, and fixedly secured in a similar aperture formed in the bridge or spider 15 extending diametrically across the annulus 16. The annulus 16 may preferably be frictionally retained in the cylindrical, upwardly projecting mouth of the hollow bracket 18, said bracket being adapted to communicate at its lower end with the horn or other sound amplifying means and to be secured to the same, or to the cabinet of the talking machine.

The cylindrical mouth of the bracket 18 may preferably be of an interior diameter slightly greater than the exterior diameter of the collar 7, so that the latter may rotate freely therein and without actually contacting therewith, and the exterior of the upper end of the bracket 18 may preferably be finished in cylindrical form and adapted for the reception of the cylindrical laterally projecting collar 21, integrally formed upon the lower end of the stud support 22, which may preferably be of substantially the shape shown in the drawing, the upper end thereof being provided with a boss 24 overhanging the portion 5 of the tone arm when the same is in operative position. The interior of the

collar 21 is of a size to form a snug fit upon the hollow bracket 18, to which it may be rigidly secured by means of one or more set screws 26 passing through suitable apertures in the collar, and threaded into the bracket, a shoulder 27 upon the exterior of the bracket serving to limit the downward movement of the collar. A suitable vertical, preferably cylindrical aperture 32 may be formed within the boss 24 for the reception of the upper stud 33, a set screw 34 serving to secure the same in any desired position within the boss, the stud 33 being preferably reduced in diameter at its lower end 36, to form a shoulder 37, and the various parts of the device hitherto described being preferably so proportioned and arranged that the longitudinal axes of the spaced studs 33 and 13 will coincide. If desired, a pair of downwardly depending stops 30 may be provided upon the collar 7, one upon each side of the bridge 15, to limit the lateral movement of the tone arm by engagement with the sides of the bridge.

For the purpose of providing a flat bearing upon the tone arm for the lower end of the upper stud 33, a part of the top wall of the elbow of said tone arm is depressed and a part is struck-up or elevated in such manner that a flat surface 40 extending approximately normal to the axis of the portion 5 of the tone arm is formed thereon. This surface may preferably be substantially circular in shape, its center being approximately in alinement with the axis of the lower stud 13. While the formation of this substantially flat surface upon the tone arm may be accomplished in any desired manner, I prefer to form the same by the action of simultaneously upwardly and downwardly moving plungers operating upon the metal or other material of which the tone arm is formed while the latter is rigidly secured in a suitable die or holder, the upwardly moving plunger operating within the portion 5 of the tone arm and the downwardly moving plunger operating upon the exterior surface of the tone arm, the resultant action of these plungers being to force the metal or other material of which the tone arm is formed outwardly from the surface thereof upon one side of the center of said plungers to form a bulge 42, and to depress the metal upon the other side of the center of said plungers to form an indentation 42' whereby a portion of the wall of the tone arm between said plungers is forced into a plane surface to form the flat, substantially horizontal surface 40 already described.

Substantially at the center of the surface 40 an aperture 46 may be formed in the wall of the tone arm suitable for the reception of the bushing 48, which may preferably consist of a cylindrical body 49 having at its

upper end: an outwardly projecting annular flange 50, the bushing being provided with a longitudinally extending, cylindrical aperture 51 suitable for the reception of the reduced portion 36 of the upper stud 33. The body of the bushing may be secured within the aperture 46 in any suitable or desired manner, although for this purpose I prefer to upset the lower end thereof in a suitable press, after the bushing has been inserted in the aperture 46 with the under side of the flange contacting with the horizontal surface 40, as clearly shown in Fig. 2, whereby the bushing is so rigidly secured to the tone arm that it becomes, for all practical purposes, as much a part of the arm itself as if actually formed out of the same material and integral therewith.

It will thus be evident that when the tone arm 1 is positioned upon the lower stud 13, with the bridge 10 resting upon the flange 14, and the upper stud 33 slid downwardly in the boss 24 until the face of the shoulder 37 comes into smooth even contact with the upper surface of the bushing 48, the stud 33 being secured in that position by means of the set screw 34, that the tone arm will be pivoted upon two separated or spaced studs, in such a manner as to be free to revolve around the same in a horizontal plane, but will be precluded from vertical movement. It will moreover be evident that the tone arm can be readily removed from its operative position by loosening the set screw 34 and raising the stud 33 out of engagement with the bushing 48, and that the latter will at all times be securely attached to, and for all practical purposes be substantially a part of, the tone arm.

While I have herein described one embodiment of my invention with considerable particularity for the purpose of enabling those skilled in the art to comprehend the same, I do not desire to limit myself to the exact details of construction and arrangement which I have illustrated and described, as it will be evident that various changes and modifications may be made in the details of the device, such for instance as in the shape of the bushing 50 which

could be readily varied, or in fact which might be omitted entirely and the aperture 46 alone employed for the reception of the point or end of the stud 33, without departing from the spirit and scope of my invention as defined in the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

1. As an article of manufacture, a tapering tone arm of thin ductile metal consisting of two portions extending substantially at right angles to each other and united by an elbow or bend integral therewith, a portion of the material of said elbow being indented into said elbow and a portion of the material of said elbow being pressed outwardly from said elbow to form therein a substantially flat circular portion integral with said elbow, the plane of said flat surface being normal to and in substantial alinement with the axis of that portion of said tone arm of the larger diameter and said flat portion being provided with an opening in alinement with said axis.

2. As an article of manufacture, a tapering tone arm of thin ductile metal consisting of two portions extending substantially at right angles to each other and united by an elbow or bend integral therewith, a portion of the material of said elbow being indented into said elbow and a portion of the material of said elbow being pressed outwardly from said elbow to form therein a substantially flat circular portion integral with said elbow, the plane of said flat surface being normal to and in substantial alinement with the axis of that portion of said tone arm of the larger diameter and said flat portion being provided with an opening in alinement with said axis, and a bushing tightly fitted into said opening and having a flat exterior surface parallel to the surface of said flat portion.

In witness whereof I have hereunto set my hand this 29th day of March, A. D. 1915.

OSCAR J. CLAIR.

Witnesses:-

MARGUERITTE McFALLS,
CHARLES F. WILLARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



PHONOGRAPH RECORD CABINET

#1,190,748-----C.D.Freeman.

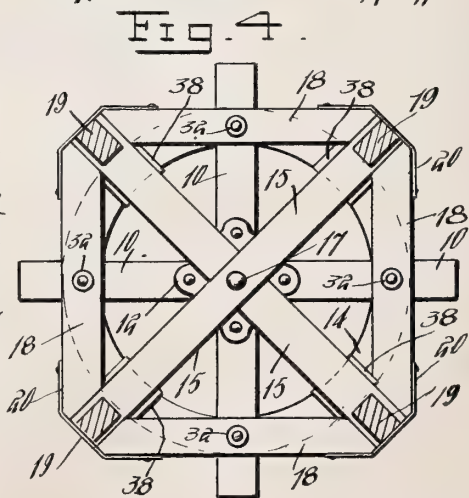
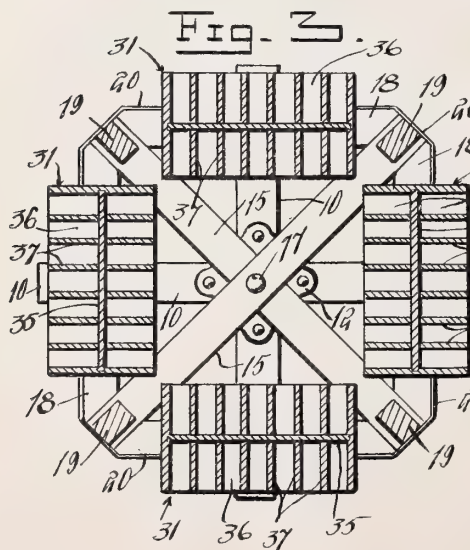
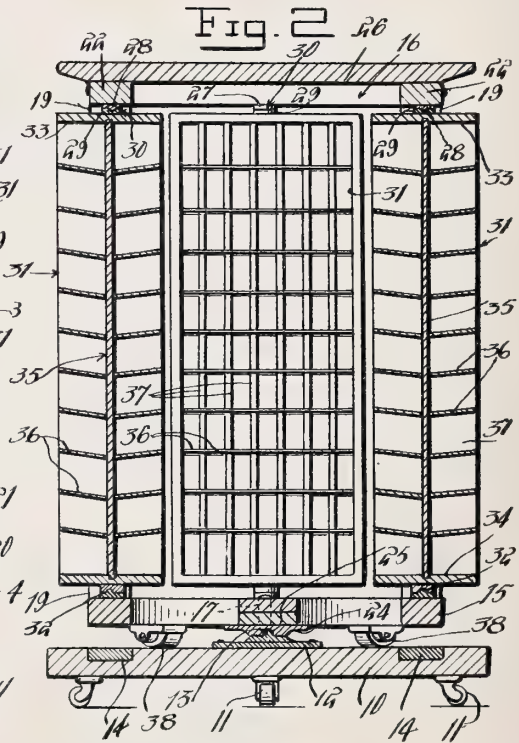
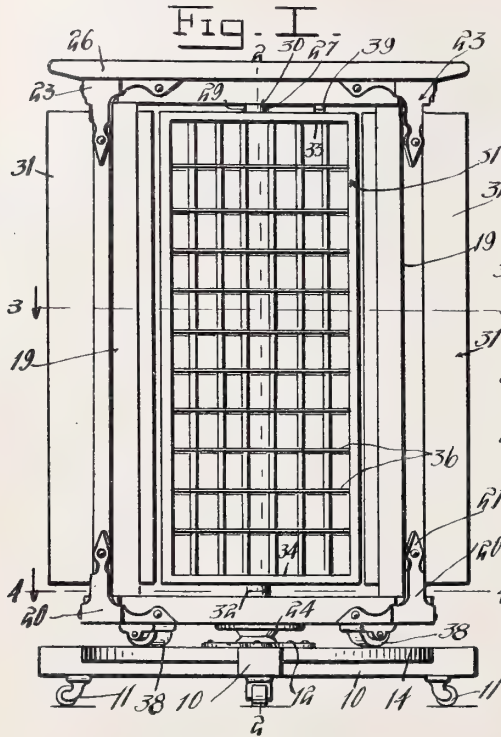
Patented-July 11th, 1916.

Filed-June 5th, 1913.

C. D. FREEMAN.
 PHONOGRAPH RECORD CABINET.
 APPLICATION FILED JUNE 5, 1913.

1,190,748.

Patented July 11, 1916.



Inventor
 C. D. Freeman.

Witnesses
 J. C. Simpson
 H. M. Test

By *Charles H. H. H.*
 Attorney

UNITED STATES PATENT OFFICE.

CHARLES D. FREEMAN, OF LOCKPORT, NEW YORK.

PHONOGRAPH-RECORD CABINET.

1,190,748.

Specification of Letters Patent.

Patented July 11, 1916.

Application filed June 5, 1913. Serial No. 771,946.

To all whom it may concern:

Be it known that I, CHARLES D. FREEMAN, a citizen of the United States, residing at Lockport, in the county of Niagara, State of New York, have invented certain new and useful Improvements in Phonograph-Record Cabinets; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in cabinets and particularly to a cabinet for holding phonograph records.

One object of the invention is to provide a revolving cabinet in which are mounted a plurality of record holding members.

Other objects and advantages will be apparent from the following description when taken in connection with the accompanying drawings.

In the drawings: Figure 1 is an elevation of a cabinet made in accordance with my invention. Fig. 2 is a vertical section on the line 2—2 of Fig. 1. Fig. 3 is a horizontal sectional view on the line 3—3 of Fig. 1. Fig. 4 is a horizontal sectional view on the line 4—4 of Fig. 1 looking in the direction of the arrows.

Referring particularly to the accompanying drawings, the base or stand of the cabinet comprises a pair of bars 10 which are crossed at their centers and suitably secured together, the outer ends of said bars carrying the supporting caster wheels 11. Mounted on the bars 10 at their point of intersection is a plate 12, in the upper central portion of which is a boss or knob 13. Also secured to the bars 10 on the upper sides is a circular track 14.

Arranged on the base, is a revolving cabinet which comprises a lower structure consisting of the crossed bars 15, and the upper crossed bars 16, a rod 17 extending vertically through the intersections of the bars 15 and 16 to hold them in proper superposed relation. Connecting the ends of the bars 15 are bars or strips 18, and between the ends of the bars 15 and the bars 16 are vertical posts or uprights 19, these posts being suitably secured to the said bars 15 and 16, and bracing straps 20 being secured to the strips 18 and extending around the ends of the bars 15. These straps have vertical portions 21 which are secured to the posts 19.

The upper strips 16 are connected by the strips 22 and have the straps 23 secured in a similar manner to the straps 20. Secured to the bars 15, and below the centers thereof is a plate 24 which has a socket 25 for the reception of the beforementioned boss 13. On the upper sides of the bars 16 is secured a suitable top 26, on which can be placed the phonograph.

Secured to the under faces centrally of the bars 22 are plates 27 which are provided with bosses 28 for movement in sockets 30 of the plates 29, these plates 29 being secured to the upper ends of the revolving sections 31. Pivotal connections similar to the parts 27, 28, 29 and 30 support the lower ends of the sections 31, as indicated at 32. These sections comprise top and bottom walls 33 and 34, respectively, between which are secured the vertical transverse partitions 35. These partitions 35 are arranged centrally in the sections, and extending from the outer opposite sides of the sections, and inclining downwardly toward the middle partition are shelves 36, these shelves extending from one side of the section, transversely to the other. Extending forwardly and rearwardly in both front and rear portions of the sections 31 are vertical partitions 37, these partitions dividing both front and rear of each of the sections into a plurality of compartments suitable for the reception of disk phonograph records.

Secured on the bottom of the bars 15 are rollers 38 which bear on the track 14 and support the cabinet as it is revolved. Mounted on the under face of each of the strips 22 is a leaf spring finger 39, this finger being adapted to bear frictionally on the upper wall of a section 31, to hold the same for accidental rotation.

It will thus be seen that the upper structure which carries the wheels 38 can be rotated on the track 14, to bring any one of the sections 31 to the front for easy access. It will also be noted that when so brought, said section can be rotated independent of the main portion of the cabinet, so that access can be had to the other side of said revoluble section.

What is claimed is:

A phonograph record cabinet comprising a base, a rotatable frame mounted thereon and formed of cross bars and connecting strips, a plurality of vertically disposed

posts secured at their lower ends to said frame and having a top secured to their upper ends, and a plurality of independently rotatable sections pivotally mounted
5 in the connecting strips and top respectively, and having record receiving compartments opening from the opposite sides thereof, whereby access to all of the com-

partments can be had from a single point at one side of the cabinet.

19

In testimony whereof, I affix my signature, in the presence of two witnesses.

CHARLES D. FREEMAN.

Witnesses:

A. B. BECKER,
LEMUEL PUTS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

VOICE AND SOUND RECORDING MACHINE

#1190787-----F. E. Miller,

Patented-July 11th, 1916.

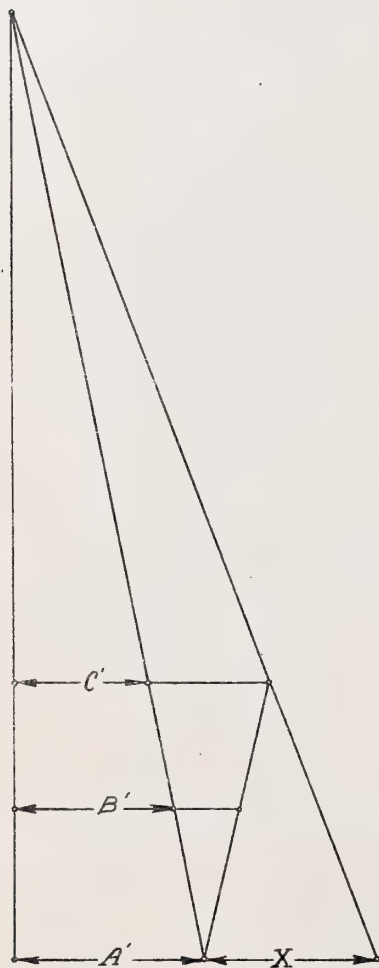
Filed-February 9th, 1915.

F. E. MILLER.
VOICE AND SOUND RECORDING MACHINE.
APPLICATION FILED FEB. 9, 1915.

1,190,787.

Patented July 11, 1916.

2 SHEETS—SHEET 1.



Full size construction
to obtain length of "X."

The general form for radius of Voice Cone
of 4θ and Volume V is $r = \sqrt[3]{\frac{V \times 3 \tan \frac{\theta}{2}}{\pi}}$

WITNESSES:

James J. McLean
Ernest Elmer Brown

INVENTOR

Frank Ebenzer Miller

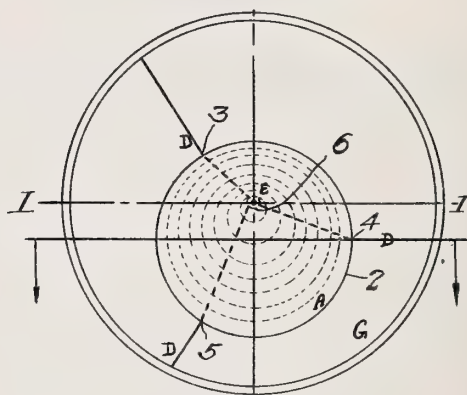


Figure 2.

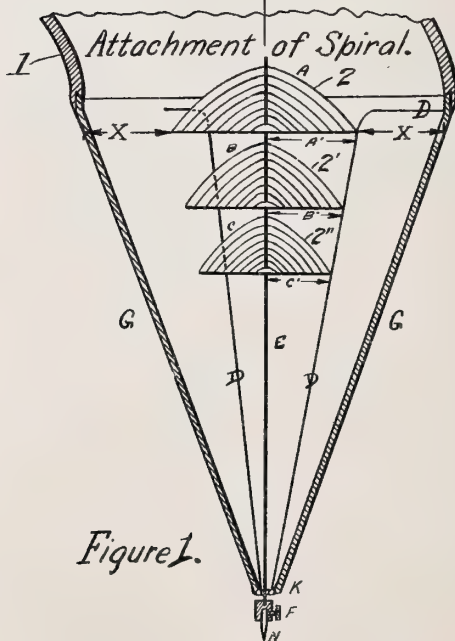


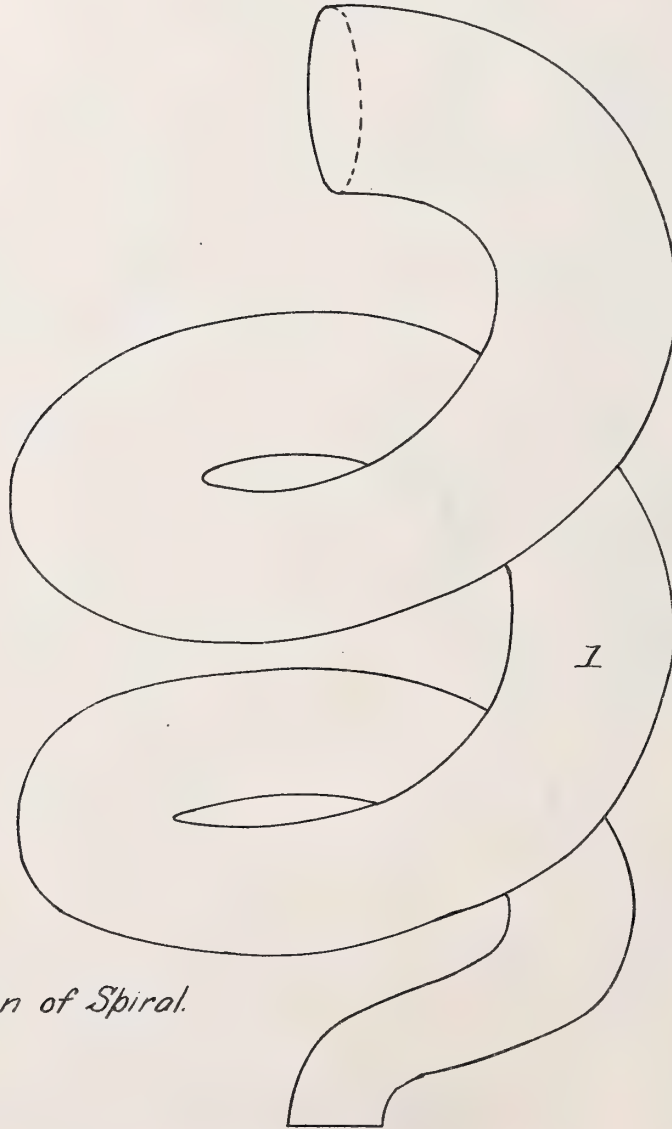
Figure 1.



F. E. MILLER.
VOICE AND SOUND RECORDING MACHINE.
APPLICATION FILED FEB. 9, 1915.

1,190,787.

Patented July 11, 1916.
2 SHEETS—SHEET 2.



Elevation of Spiral.

Figure 3.

WITNESSES:
James J. McLean
Ernest Elmer Brown

INVENTOR
Frank E. Miller

UNITED STATES PATENT OFFICE.

FRANK EBENEZER MILLER, OF NEW YORK, N. Y.

VOICE AND SOUND RECORDING MACHINE.

1,190,787.

Specification of Letters Patent.

Patented July 11, 1916.

Application filed February 9, 1915. Serial No. 7,035.

To all whom it may concern:

Be it known that I, FRANK EBENEZER MILLER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new and useful Voice and Sound Recording Machine, of which the following is a specification.

My invention relates to improved sound-mechanism having features applicable both to the recording of sound and to the reproduction of sound from a record or other known means.

The object of my invention is to provide functioning parts for overtones and the many peculiar refinements of sound as well as for fundamental tones.

A further object of my invention is to provide a sound-mechanism as nearly omnifunctioning as possible relatively to the variations in tone and quality without the excluding or limiting effect of a mechanical medium having itself a definite pitch period or pitch periods of too limited variation.

More concretely expressed, the object of my invention is to improve upon the employment of a flat disk of vibratory material for the reproduction of or the recording of sounds. That is, to improve such a disk, for example, as is commonly employed in a telephone receiver or phonograph sound box.

My experiments have taught me that a flat disk is greatly limited in its range of pitch periods in that its vibration is dependent upon nodal arrangements wholly in the same plane, while my special study and practice in connection with the human anatomy of the auditory and vocal organs has taught me that nature never limits its sound mechanism to a nodal arrangement in a unitary plane. For example, the outer ear of the human anatomy comprises approximately two and one-half turns of what may be termed a sound spiral and then terminates inwardly against the tympanum which itself is a cup-shaped diaphragm having the umbo peculiarly eccentric relatively to the tympanic ring to which the margin of the tympanum is attached. It is against this eccentric projection of the cup called the umbo with which the engaging end of the malleus or hammer-bone coöperates in the sound-functioning of the bones of the ear. I have discovered that the umbo is located relatively to three equi-distant points on the

margin of the tympanum at distances 3, 4 and 5. It has likewise come under my observation that the three main cavities of the human voice anatomy likewise have the volumetric proportion of 3, 4, 5. They are respectively the laryngeal cavity, the nasal cavities, and the mouth cavity.

In carrying out the objects of my invention I purpose to simulate in a large degree the peculiar anatomical features as to proportion, shape, and arrangement to be found in the human ear.

The above will be pointed out in the accompanying claims and will be more fully understood by reference to the illustrative embodiment of my invention described in the following specification, which should be read in connection with the embodiment illustrated in the accompanying drawings, which form a part hereof, in which like characters designate corresponding parts in the several figures, and in which—

Figure 1 is a vertical section through line I—I of Fig. 2; Fig. 2 is a plan view of the parts shown in Fig. 1; and Fig. 3 is a perspective elevation drawn to a reduced scale of a spiral horn.

G is a cone-shaped receptacle suitably formed and fabricated to form a closed terminal structure for the spiral horn 1. I sometimes desire to determine the diameter of the base of this cone-shaped structure G for a given volume and a given angle at the apex of the cone. In such event, when radius of the base = r ; volume = v ; and θ — the apex angle of the cone, I find that the following formula is useful—

$$r = \sqrt[3]{\frac{V \tan. \frac{\theta}{2}}{\pi}}$$

The receptacle G ends in a ring K at approximately the apex and to this ring are attached three relatively equally spaced supporting wires D which extend obliquely upward within the receptacle G and their upper ends are bent upwardly and suitably secured to the inner walls of the receptacle G. These wires D serve as the supports for the principal sound-functioning mechanism of my invention.

Fundamentally, this principal sound-functioning mechanism is a diaphragm 2 formed of tin or other suitable pliable material into a peculiar eccentric cup-shape, as shown in the drawings and approximating

in configuration what I term a sound spiral or the configuration of a nautilus shell when viewed in a trans-axial section. Furthermore, this cup also simulates the tympanum of the human ear and the individual growth-partitions of the nautilus shell. This cup 2 may be suitably supported as by friction or by soldering from the three wires D at the points 3, 4 and 5. I prefer that the contour and configuration of this cup 2 be such that the eccentric cupola or umbo 6 of the cup be located in the proportionate distance from the points 3, 4 and 5, respectively 3, 4 and 5 units as shown in the drawings. I likewise prefer to locate the cup 2 within the conical receptacle G substantially, so that the points 3, 4, and 5 are respectively at distances in the proportions 5, 4 and 3 from the most adjacent portions of the interior of the conical receptacle G, all as shown in the drawings.

I preferably construct the cup 2 of a size so that its content-volume approximates the content-volume of the mouth cavity of the human voice anatomy.

A rod E projecting through the ring K at the end of the conical receptacle G is fitted with a chuck and set screw F for the purpose of holding a suitable vibration co-operator shown in the form of a stylus N. This rod E is suitably extended and secured to the umbo 6 of the cup 2. In this way I have provided a vibratory medium in the form of the cup 2 which I may describe as having vibratory functions in planes of many directions and also as having vibratory pitch periods coördinating in the proportion 3, 4 and 5, just as is present in the tympanum of the human ear.

The better to carry out further refinements in sound functioning I propose the employment not merely of a single vibratory means such as the single cup 2 but contemplate in amplification the employment of a complete nest or set of cups A of which I have shown eight in all, seven nested within the cup 2. Likewise, I have appreciated the advantage of the employment of a plurality of nests of cups and have illustrated three nests, B and C in addition to the nest A. In the nest B the cup 2' I prefer to form of a volumetric capacity equivalent to the volumetric capacity of the nasal cavities of the human voice

anatomy. Likewise, I purpose to form the cup 2'' of the nest C of a volumetric capacity equal to the volume of the laryngeal or back throat cavity of the human voice anatomy. Like the nest of the cups A, the nest of cups B comprises eight, seven nested within the cup 2', and the nest C comprises eight cups, seven nested within the cup 2''. The rod E connects at the umbo with each of the cups of the various sets regardless of how many sets or how many cups in a set are employed, so that sound vibrations from each cup are transferred to and through the rod E to the stylus N, or vibrations are transferred from the stylus N to and through the rod E to be reproduced as sound by the cups.

It is to be understood that the conical receptacle G and the spiral horn 1 are useful in amplifying the sound or vibrations made through the functioning of the cup or cups and that the positioning of each cup permits sound reflection without interference.

What I claim and what I desire to secure by United States Letters Patent is:

1. In a sound-functioning mechanism, a vibratory medium in the shape of an eccentric cup-shaped diaphragm; and vibration transmitting means coöperating with said diaphragm at the umbo of eccentricity.

2. In sound mechanism, a sound diaphragm having a substantially circular periphery and being cup-shaped with the locality of maximum displacement spaced in substantially the proportion of 3, 4 and 5 from three equi-distant points at the periphery of the diaphragm.

3. In sound mechanism, a diaphragm approximating the shape of the tympanum of the human ear; and a transmitter of vibrations coöperating with said diaphragm at the locality corresponding to the umbo of the human tympanum.

4. In a sound mechanism, an eccentric cup-shaped diaphragm having a volumetric capacity approximating the volumetric capacity of one of the three cavities of the human voice anatomy.

FRANK EBENEZER MILLER.

Witnesses:

JAMES J. McLEAN,
ERNEST CLIVE BROWN.

OPERATING MECHANISM FOR PHONOGRAPHS.

#1,190,808-----H. A. STOIBER,

Patented-July 11th, 1916.

Filed-May 23rd, 1911.

H. A. STOIBER.
 OPERATING MECHANISM FOR PHONOGRAPHS.
 APPLICATION FILED MAY 23, 1911.

1,190,808.

Patented July 11, 1916.

2 SHEETS—SHEET 1.

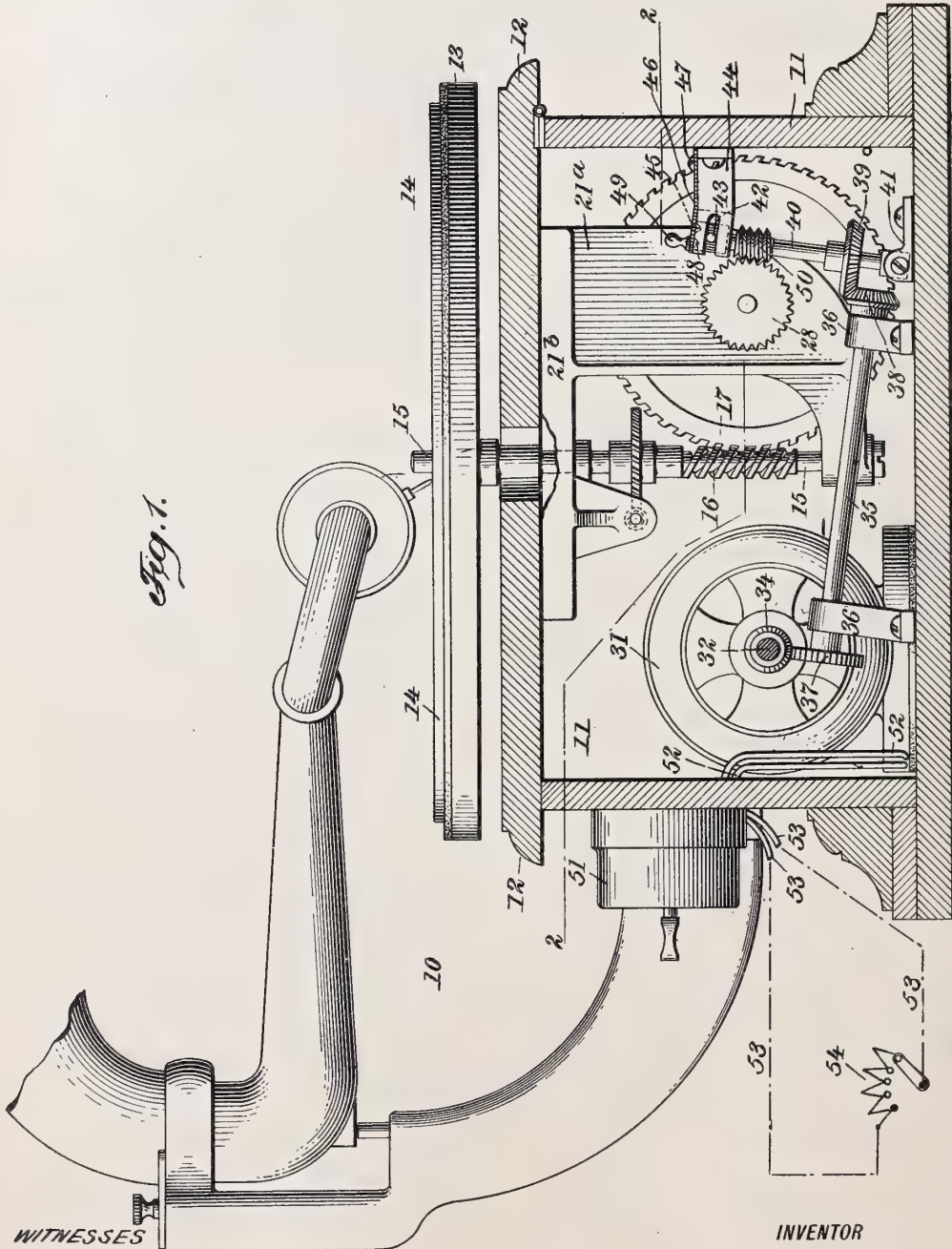


Fig. 1.

WITNESSES

Julius H. Kutz
Edwin H. Dietrich

INVENTOR

HERBERT A. STOIBER

BY

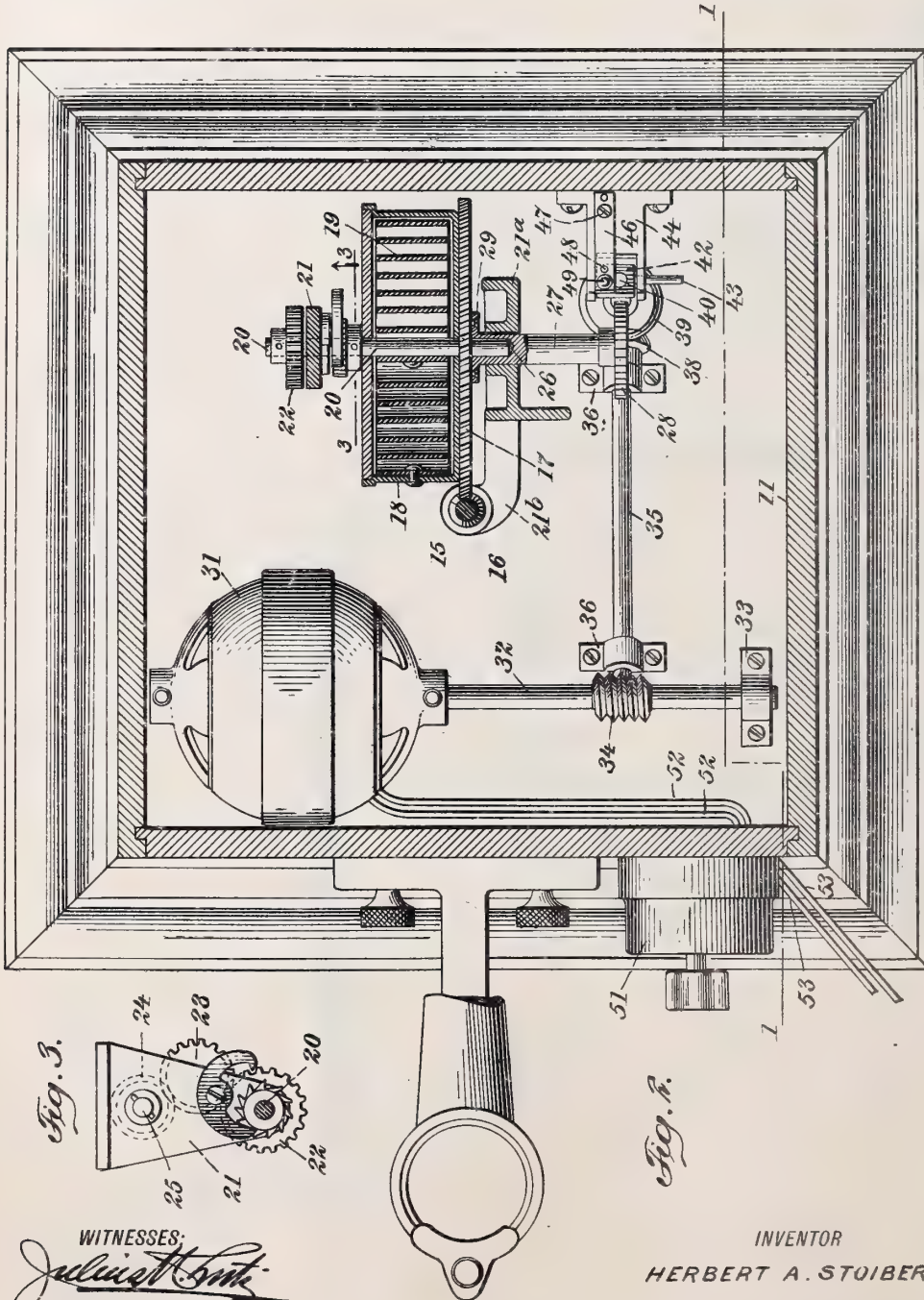
Comad A. Dietrich
 his ATTORNEY

H. A. STOIBER.
 OPERATING MECHANISM FOR PHONOGRAPHS.
 APPLICATION FILED MAY 23, 1911.

1,190,808.

Patented July 11, 1916.

2 SHEETS—SHEET 2.



WITNESSES:
Julius H. Smith
Edwin H. Dietrich

INVENTOR
 HERBERT A. STOIBER
 BY
Samuel A. Dietrich
 his ATTORNEY.

UNITED STATES PATENT OFFICE.

HERBERT A. STOIBER, OF NEW YORK, N. Y.

OPERATING MECHANISM FOR PHONOGRAPHS.

1,190,808.

Specification of Letters Patent.

Patented July 11, 1916.

Application filed May 23, 1911. Serial No. 628,927.

To all whom it may concern:

Be it known that I, HERBERT A. STOIBER, a citizen of the United States, residing at the city of New York, borough of Brooklyn, Kings county, in the State of New York, have invented certain new and useful Improvements in Operating Mechanism for Phonographs, of which the following is a full, clear, and exact specification.

My invention relates to improvements in operating mechanism for phonographs and other apparatus and the same has for its object more particularly to provide a simple, efficient and reliable driving mechanism comprising two separate power units which are adapted to be brought into operation at will, to actuate the disk shaft of the phonograph.

Further, said invention has for its object to provide a motive power for phonographs comprising a spring or primary motor, and an electric or secondary motor, either of which may be brought into operation at will to rotate the shaft of the spring motor.

Further, said invention has for its object to provide a driving mechanism comprising a spring motor, and an electric motor, an intermediate mechanism whereby one or the other of said motor units may be brought into or out of engagement, at will, with the shaft of the spring motor, and means for locking said intermediate mechanism to its adjusted position.

To the attainment of the aforesaid objects and ends, my invention consists in the novel details of construction and in the combination, connection and arrangement of parts hereinafter more fully described and then pointed out in the claims.

In the accompanying drawings, forming part of this specification, wherein like numerals of reference indicate like parts, Figure 1 is a side view partly in section taken on the line 1—1 of Fig. 2, showing a phonograph with operating mechanism constructed according to, and embodying my said invention; Fig. 2 is a horizontal section taken on the line 2—2 of Fig. 1, and Fig. 3 is a detail section taken on the line 3—3 of Fig. 2 looking in the direction of the arrow.

In said drawings 10 designates a phonograph of the usual construction comprising a casing 11 having a hinged top or cover 12 above which is revolvably supported a plate 13 adapted to receive the record disk

14. The plate 13 is supported upon a vertical shaft 15 mounted in suitable bearings, and having a worm gear 16 adjacent to its lower end meshing with a gear wheel 17 connected to the barrel 18 inclosing the driving spring 19.

20 denotes a shaft supported in bearings 21, 21^a arranged upon a frame 21^b depending from the under side of the cover 12. Said shaft 20 extends horizontally through the spring barrel 18 and is connected intermediate its ends to the inner end of the coil spring 19 arranged within said barrel 18. Upon the shaft 20, adjacent to one end thereof, is fixed a gear wheel 22 in mesh with a gear wheel 23 which latter in turn meshes with a gear wheel 24 fixed upon a winding stem 25 which has its outer end terminating adjacent to an aperture (not seen) in the side of the casing 11. The end of said stem 25 is adapted to receive a key whereby said spring of the motor may be wound up. The opposite end of said shaft 20 is supported within a socket 26 provided in a shaft 27 mounted in the bearing 21^a. At the outer end of said shaft 27 is fixed a spur gear 28, and at the inner end of the shaft 27 is provided a flanged head 29 which is secured to the gear wheel 17 on the barrel 18 by screws, or other suitable means. In the bottom of the casing 11 is secured an electric motor 31 having a shaft 32 extending therefrom which has its free end supported in a bearing 33. 34 denotes a worm gear arranged upon said shaft 32, and 35 denotes a driven shaft in bearings 36, 36 and arranged in an inclined position at right angles to the shaft 32 of the electric motor 31, and to the shaft sections 20, 27 of the spring motor 18. At one end of the shaft 35 is fixed a gear 37 meshing with the worm gear 34 on the shaft 32 of the electric motor, and at the opposite end of said shaft 35 is fixed a bevel gear 38 which meshes with a bevel gear 39 fixed upon a vertical shaft 40. The lower end of said shaft 40 is pivotally supported in a bearing 41 secured upon the base of the casing 11, and the upper portion of said shaft 40 is disposed within a rectangular head 42 having pins 43 secured therein and projecting outward therefrom in opposite directions. Only one of said pins which is longer than the other, and serves as a finger portion, is visible.

44 denotes a bracket secured upon the inner side of the casing 11 having its free end bifurcated and slotted to receive the head 42 on the shaft 40, and the ends of the pins 43 extending therefrom. The upper surface of the head 42 is provided with a plurality of recesses 45, 45, and 46 denotes a spring having one end secured upon the upper side of the bracket 44 by screw 47 and its free end provided with a projection or tooth 48 adapted to engage the recesses 45, 45 in the upper side of the head 42.

49 denotes a knob or finger portion provided upon the upper surface of the spring 46 whereby the projection or tooth 48 upon the under side of the spring may be released from its engagement with the recesses 45, 45 arranged in the upper side of the head 42.

50 denotes a worm gear fixed upon the pivotally supported shaft 40, and adapted to mesh with the spur gear 28 arranged upon the shaft section 27 of the motor.

Upon the outer side of the casing 11 is arranged a switch 51.

52, 52 denote conductors leading from the switch 51 to the electric motor 31, and 53, 53 denote conductors leading from a source of electric energy to the switch 51, and including a resistance 54.

The operation of the apparatus is as follows: When it is desired to operate the phonograph by means of the primary or spring motor, it merely becomes necessary to disconnect the worm gear 50 from the spur gear 28 by releasing the projection on the under side of the spring 46 from its engagement with the recesses 45 in the upper side of the head 42, and then moving the upper end of the shaft 40 aside until the teeth of the worm 50 are disengaged from the teeth of the spur gear 28. Thereupon the spring motor may be wound up and the same will operate the apparatus in the usual manner.

When it is desired to operate the apparatus by means of the electric or secondary motor 31, it merely becomes necessary to shift the worm gear 50 into engagement with the spur gear 28, as indicated at Fig. 1 of the drawings, and then operate the switch 51 to complete the electric circuit. In this arrangement power will be transmitted from the shaft 32 to the worm gear 34, gear 37, shaft 35, bevel gears 38 and 39, shaft 40, worm 50, spur gear 28 to the shaft section 27 and thence to the gear 17 on the spring barrel, thereby causing rotation of the vertical shaft 15 by means of the worm 16. The speed with which the electric motor operates may be controlled by the resistance 54.

It will be observed that by means of my invention I am enabled to provide a supple-

mental driving mechanism which is adapted to actuate the main shaft of the spring motor, independently of the spring. This supplemental driving mechanism being particularly useful where large record disks are used and which are rotated at a uniform rate of speed from beginning to end.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:—

1. A machine of the character described having a disk operating shaft, a primary motor, and a pair of gears on the shaft of said primary motor; one of said gears being normally operatively connected with said disk operating shaft, in combination with a supplemental motor, a shaft on said supplemental motor, a worm fixed on the shaft of said supplemental motor, a driven shaft, gear wheels at the ends thereof, one of said gear wheels meshing with the worm on the shaft of said supplemental motor, an adjustable shaft pivotally supported at one end, a gear thereon adapted to mesh with the gear at one end of said driven shaft, a worm adapted to mesh with the other of the gears on the shaft of said primary motor, means for guiding the upper end of said pivoted shaft, and locking means for securing said pivoted shaft to its operative and inoperative positions, substantially as specified.

2. A machine of the character described having a disk operating shaft, a worm fixed thereon, a spring motor, a gear thereon normally in mesh with the worm on said disk operating shaft; said spring motor having a shaft composed of two parts and one of said parts being connected to the spring of said motor, and the other of said parts secured to the gear normally in mesh with the worm on said disk operating shaft, in combination with a gear on the outer end of said second-named shaft part, a supplemental motor, a worm fixed on the shaft of said supplemental motor, a driven shaft, a gear at one end of said driven shaft in mesh with the worm on said supplemental motor shaft, and a bevel gear at the opposite end of said driven shaft, an adjustable shaft pivotally supported at its lower end, a bevel gear fixed upon said adjustable shaft adjacent to said lower end adapted to mesh with the bevel gear on said driven shaft, a worm fixed adjacent to the upper end of said pivoted shaft adapted to mesh with the gear on said second-named shaft part of the spring motor shaft, a head upon the upper end of said pivoted shaft, a guide within which said head is adapted to work, and locking means arranged upon said guide adapted to engage the head on said pivoted shaft whereby to hold the same locked in its operative and inoperative positions, substantially as specified.

3. A machine of the character described

having a disk operating shaft, a worm fixed thereon, a primary motor, a gear thereon in mesh with the worm on said disk operating shaft, a shaft for said primary motor composed of two parts; one of said parts being connected to the driving element of said primary motor, and the other of said parts being secured to the gear mounted upon said primary motor, in combination with a gear fixed upon the other end of said second-named shaft part, a supplemental motor, a worm fixed upon the shaft of said supplemental motor, a driven shaft, a gear at one end thereof in mesh with the worm on said supplemental motor shaft, and a bevel gear at its opposite end, an adjustable shaft pivotally supported at its lower end, a bevel gear fixed thereon adjacent to said lower end adapted to mesh with the bevel gear on said driven shaft, a worm fixed adjacent to the upper end of said pivoted shaft adapted

to mesh with the gear on the second-named part of the shaft of said primary motor, a head upon the upper end of said pivoted shaft, a bracket supported adjacent to the upper end of said shaft having its free end bifurcated to receive said head, said head being provided with recesses, and a locking spring secured upon said bracket having a projection upon its under side adapted to engage with either of the recesses in said head whereby to hold said pivoted shaft locked to its operative and inoperative positions, substantially as specified.

Signed at the city of New York, in the county and State of New York, this twentieth day of May, nineteen hundred and eleven.

HERBERT A. STOIBER.

Witnesses:

CONRAD A. DIETERICH,
JOSEPH G. QUINN, Jr.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

GRAPHOPHONE PATENT.

RECORD HOLDER,
#1,191,003-----J.W.Hughes,
Patented-July 11th, 1916.
Filed-Aug. 11th, 1914.

1,191,003.

Patented July 11, 1916.
 2 SHEETS—SHEET 1.

Fig. 1.

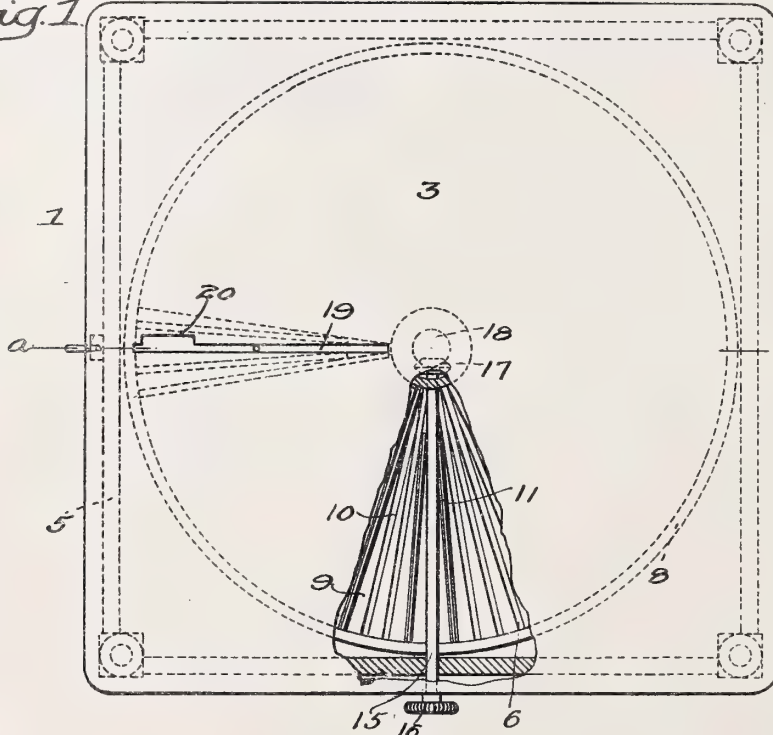


Fig. 3.

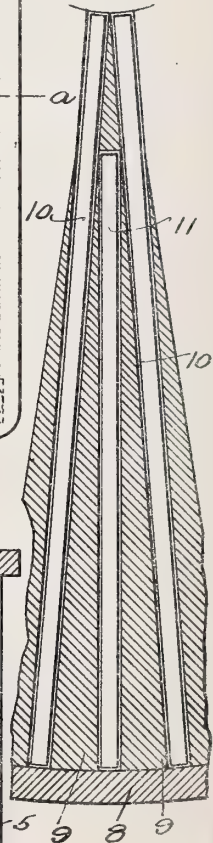
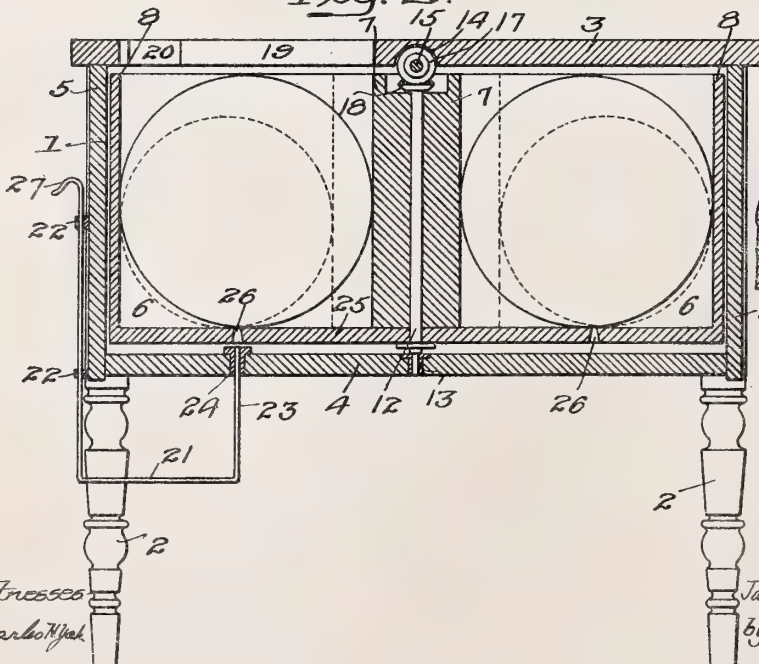


Fig. 2.



Witnesses
 Charles M. York
 Hubert B. Burns

Inventor—
 James W. Hughes
 by His Attorneys
 Howson & Howson



1,191,003.

J. W. HUGHES.
RECORD HOLDER.
APPLICATION FILED AUG. 11, 1914.

Patented July 11, 1916.
2 SHEETS—SHEET 2.

Fig. 4.

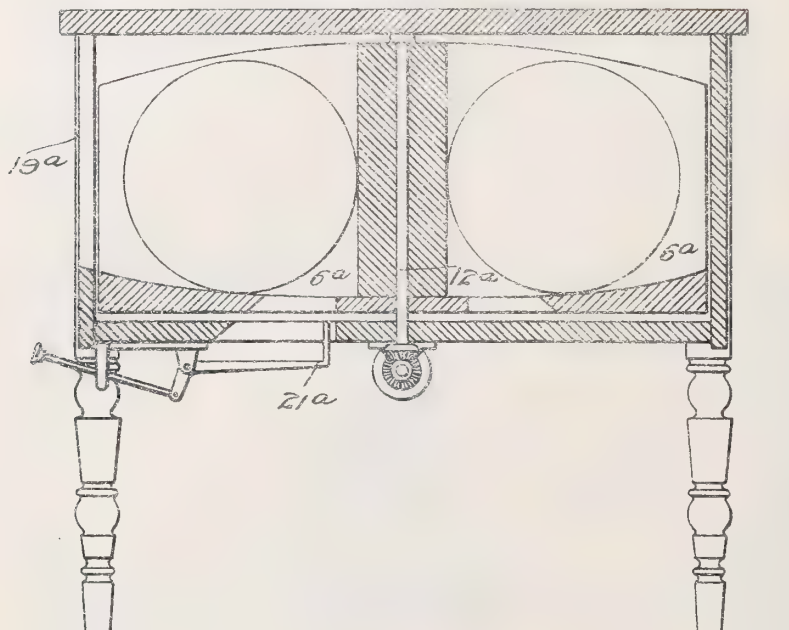
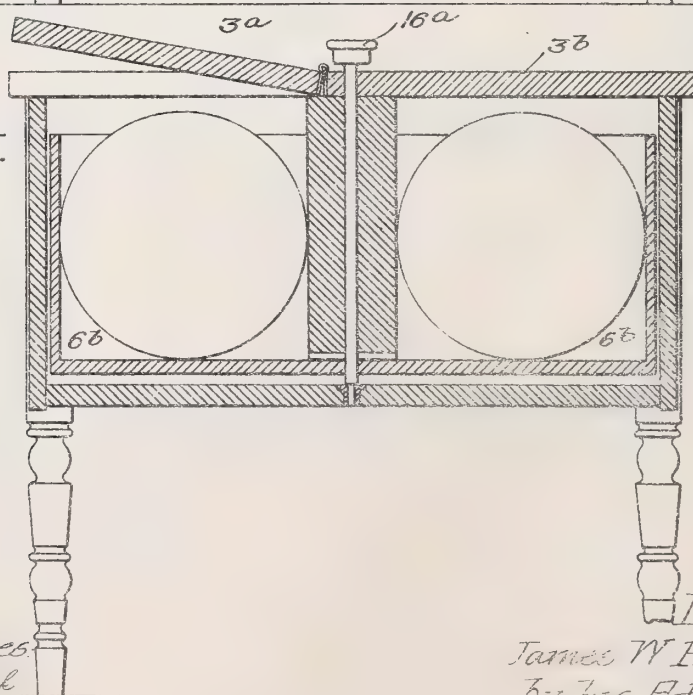


Fig. 5.



Witnesses
Charles H. York
Willet & Bunona

Inventor.
James W. Hughes.
by His Attorneys.
Hosmer & Howen

UNITED STATES PATENT OFFICE.

JAMES W. HUGHES, OF NARBERTH, PENNSYLVANIA, ASSIGNOR TO HUGHES-LIPPINCOTT COMPANY, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

RECORD-HOLDER.

1,191,003.

Specification of Letters Patent.

Patented July 11, 1916.

Application filed August 11, 1914. Serial No. 856,277.

To all whom it may concern:

Be it known that I, JAMES W. HUGHES, a citizen of the United States, residing in Narberth, county of Montgomery, State of Pennsylvania, have invented certain Improvements in Record-Holders, of which the following is a specification.

One object of my invention is to construct a cabinet for holding the disk records of talking machines so that a large number of records can be held in a comparatively small space.

A further object of the invention is to construct the cabinet so that any one of the records can be quickly removed therefrom or replaced.

A still further object of the invention is to construct the cabinet so that the labels corresponding to a particular record can be read when the record is brought into line with the opening in the cabinet.

Another object of the invention is to arrange the cabinet so that records of different diameters can be alternately assembled in the carrier.

In the accompanying drawings:—Figure 1, is a plan view, partly in section, illustrating my improved disk record holder; Fig. 2, is a transverse sectional view on the line *a—*a**, Fig. 1; Fig. 3, is an enlarged plan view, showing the relation of the compartments for the record; and Figs. 4 and 5, are views illustrating modifications of the invention.

While my invention is particularly adapted for holding the disk records of a talking machine, it will be understood that it can be used for holding other narrow and flat objects, without departing from the essential features of the invention.

Referring to the drawings, 1, is the body of the cabinet supported on legs 2, in the present instance.

3 is the top of the cabinet forming a table top.

The cabinet may be square, as shown, or round, or hexagonal, or of other shapes, as desired.

4 is the bottom of the cabinet and 5, 5 are the sides.

Located within the body of the cabinet is a rotatable carrier 6 having a hub 7 and a rim 8. Mounted between the hub and the rim is a series of wedge-shaped partitions 9 and these partitions are spaced apart to

form between them compartments 10 for the records of a given diameter, and, in order to accommodate records of less diameter, compartments 11 are formed in the partitions by recessing the partitions from their outer ends inwardly, as clearly shown in Fig. 3. The standard records of the present time are twelve inches and ten inches in diameter, and the cabinet is designed to accommodate these records. The carrier is mounted on a vertical shaft 12 adapted to a bearing 13 in the bottom 4 of the cabinet and in a bearing 14 in the under side of the top 3. In the present instance, the carrier is turned by a shaft 15 having a hand wheel 16 thereon located at one side of the cabinet, and on the inner end of this shaft is a bevel gear 17 meshing with a gear 18 on the shaft 12. Other means may be used to turn the carrier without departing from the spirit of the invention.

In the top 3 of the cabinet is a radial slot 19 having an offset portion 20. This slot is of a greater length than the largest record and is of such a width as to allow a record to be projected from the carrier sufficiently to enable a person to grasp it and remove it from the slot.

In order to project any particular record, I provide a lifter 21 adapted to guides 22 and having an arm 23 which extends through an opening 24 in the bottom of the cabinet, as shown in Fig. 2. The lifter has a handle 27. In the bottom 25 of the carrier is a series of tapered holes 26 located at the same distance from the center of rotation of the carrier and the holes communicate with the compartments of the carrier and are in alignment with the end of the extension 23 of the lifter 21 so, when the lifter is raised, it will lift the disk located in the compartment directly over it, forcing it through the slot 19 in the top of the table sufficiently to allow a person to grasp the disk and to remove it.

Each partition 9 is wide enough to have the name of the particular piece pasted or printed thereon and this name, or a portion thereof, will be exposed through the offset portion 20 of the slot 19 so that a person desiring a certain disk can turn the handle 16, which will turn the carrier until the piece desired is opposite the slot 19. After a record has been removed the parts can remain in the same position until it is desired to re-

place the disk, when it can be replaced by hand and the carrier turned to any compartment desired.

I have shown the cabinet with a flat top, which can be used as a table, or as a stand for a talking machine, as desired. The shape of the cabinet as illustrated in the drawing is quadrangular, but it will be understood that it may be of any shape desired, depending upon the design considered most appropriate.

In some instances, the carrier may be mounted at one end of the table or cabinet and, where it is desired to have a perfectly flat top so that a talking machine may be mounted thereon, I may have the slot at the side of the cabinet, as indicated at 19^a, Fig. 4; the base of each of the compartments being arranged on a slight incline so that the tendency of the disk record is to remain within the carrier 6^a. I may provide a pusher, such as 21^a, which may be actuated so as to pass through one of the openings in the bottom of the carrier, pushing the record through the slot 19^a a sufficient distance so that it can be easily removed.

In Fig. 4, I have shown the operating shaft 15^a mounted under the cabinet and geared to the shaft 12^a by ordinary bevel gearing.

In Fig. 5, I have illustrated another modification in which a section 3^a of the top can be raised so as to expose a series of records, and in this instance the carrier 6^b is less in height than the records, so that they will project above the carrier to enable a person to select any one of the records and to remove it without using the pusher hereinbefore described. In this instance, I have also shown a knob 16^a projecting above the table top 3^b, which is attached to the carrier so that, on turning the knob, the carrier can be turned to the position desired.

By the above description, it will be seen that I am enabled to provide a cabinet which will accommodate a large number of talking machine records on edge in a comparatively small space. The carrier is so arranged that it will accommodate records of different diameters.

The cabinet can be of any shape desired and the carrier can be mounted in a specially

designed cabinet or in a portion of a table or other piece of furniture, without detracting from the outward appearance thereof. 55

I claim:—

1. The combination in a record holder, of a casing; a carrier mounted within the casing and having radial partitions forming compartments, the top of the casing having a slot radiating from the center of rotation of the carrier; the bottom of the carrier having an opening therein communicating with each compartment; and means in line with the slot in the top of the casing arranged to extend through the opening in the bottom of the carrier and to project a record through the opening in the top of the casing. 60

2. The combination in a record holder, of a carrier having a hub and a rim; and a series of substantially wedge-shaped partitions all radiating from a common center at the hub and extending to the rim, said partitions being spaced to form long compartments and being recessed from their outer ends inwardly to form short compartments which alternate with the long compartments; said compartments being adapted to receive disk records of different diameters. 65

3. The combination of a casing having top, bottom and sides; a carrier located within the casing and mounted on a vertical shaft having its bearings within the casing; an operating shaft extending to one side of the casing and geared to the vertical shaft, whereby the carrier can be turned, said carrier having a series of partitions spaced apart to form compartments for the disk records and having a series of openings in its bottom, one opening communicating with each compartment; a lifter mounted in guides on the casing and having a projecting portion extending through the opening in the bottom of the carrier so as to lift a record, the casing having a radial slot through which the record can be projected. 70

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses. 75

JAMES W. HUGHES.

Witnesses:

WM. E. SHUPE,
WM. A. BARR.

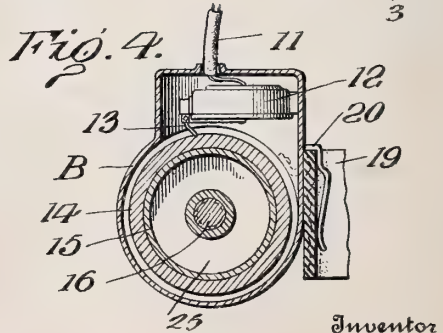
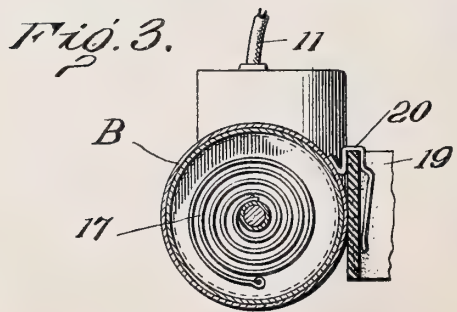
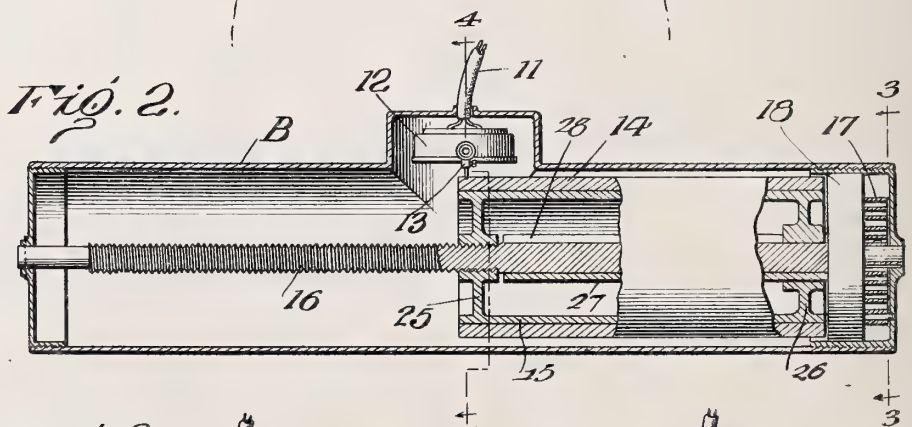
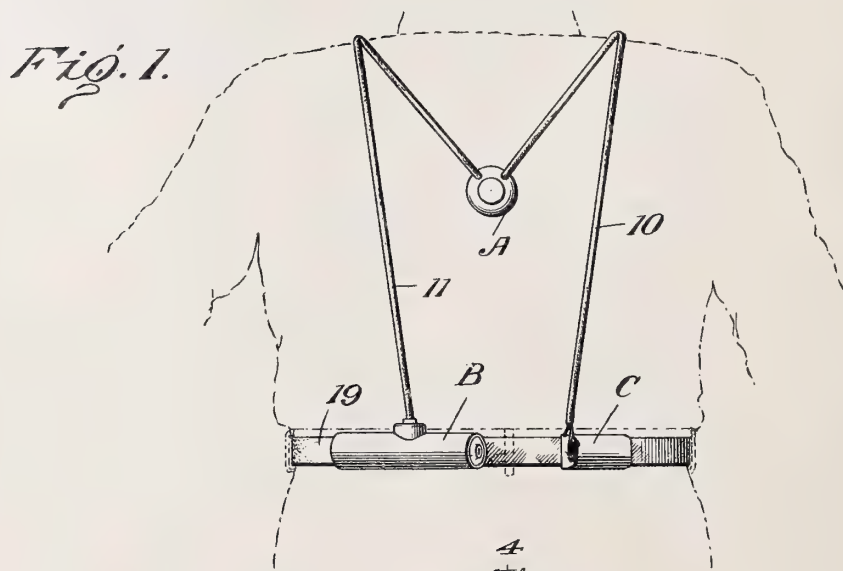
DICTOGRAPH APPARATUS,

#1,191,182-----W. Heymann,
Patented-July 18th, 1916.
Filed-August 28th, 1914.

W. HEYMANN.
 DICTOGRAPH APPARATUS.
 APPLICATION FILED AUG. 28, 1914.

1,191,182.

Patented July 18, 1916.



Witnesses
N. Abramson
J. A. Braddock.

Inventor
William Heymann
 By *Bradford & Doolittle*
 Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM HEYMANN, OF WASHINGTON, DISTRICT OF COLUMBIA.

DICTOGRAPH APPARATUS.

1,191,182.

Specification of Letters Patent.

Patented July 18, 1916.

Application filed August 28, 1914. Serial No. 859,109.

To all whom it may concern:

Be it known that I, WILLIAM HEYMANN, a citizen of the United States, residing at Washington, in the District of Columbia, have invented and discovered certain new and useful Improvements in Dictograph Apparatus, of which the following is a specification.

The object of my said invention is to provide a recording instrument of a nature adapted to record ordinary conversations, which can be worn on the person in a manner to be conveniently concealed, whereby any conversation between two parties may be recorded and afterward reproduced, the instrument being intended primarily for use in detective and such like work.

Referring to the accompanying drawings which are made a part hereof, and on which similar reference characters indicate similar parts, Figure 1 is a diagrammatic view illustrating my invention as on the person of a user, Fig. 2 a sectional view through the recording instrument, Fig. 3 a cross section on the dotted line 3—3 in Fig. 2, and Fig. 4 a cross-section on the dotted line 4—4 in Fig. 2.

In said drawings the portions marked A represent the receiver, B the recorder, and C a battery.

The receiver A is an ordinary dictograph receiver, or a receiver of any appropriate form or construction. It is electrically connected on one side to the battery C by wires contained in a cable 10, and on the other side to the recording instrument B by wires contained in a cable 11.

The recording instrument B consists of a casing containing a transmitter 12 having a stylus 13 in position to operate on the prepared surface of a cylinder 14 carried on a central cylindrical body 15. Said cylinder body 15 has a head 25 at its inner end, having a hub containing a screw-threaded perforation which engages the screw-threads of the central shaft 16 on which it is mounted, and its other end is provided with a head 26, the hub of which is perforated to slide

on a sleeve 27 surrounding and free to rotate on said shaft at the end of the casing adjacent to the operating mechanism. Said sleeve 27 is formed with a slot 28 in one side, in which a tongue of the head 26 is adapted to engage to insure the rotation of cylinder 14 as it moves longitudinally of the casing. Said sleeve 27 is adapted to be actuated by a coiled spring 17 and clock work mechanism in the casing 18 adjacent thereto. The casing has a screw-cap at each end, as shown, to facilitate the insertion and removal of the parts.

The recording instrument B may be attached to a belt 19 worn around the waist by means of a hook 20 and the battery case C is attached to the same belt in the same manner.

The instrument is intended to be worn as indicated in Fig. 1 with the receiver A preferably concealed beneath the wearer's shirt-front so that the conversation may be recorded without knowledge of the party being interviewed.

Having thus fully described my said invention what I claim as new and desire to secure by Letters Patent is:

A portable dictograph apparatus adapted to be worn concealed upon the person comprising a shaft, means for rotating said shaft, a record blank on said shaft, an electric recorder mounted to record upon said record blank, a casing inclosing said mechanism, means on said casing for detachably securing the same on the person, an electric battery also adapted for ready attachment on the person, a cable connecting said battery with said electric recorder, and a receiver interposed in the circuit, substantially as set forth.

In witness whereof, I have hereunto set my hand and seal at Washington, District of Columbia, this twenty-eighth day of August, A. D. nineteen hundred and fourteen.

WILLIAM HEYMANN. [L. s.]

Witnesses:

E. W. BRADFORD,
T. A. BRADDOCK.

TOY PHONOGRAPH ,

#1,191,202-----T. J. Little, Jr.,
Patented-July 18th, 1916.
Filed-Dec. 30th, 1914.

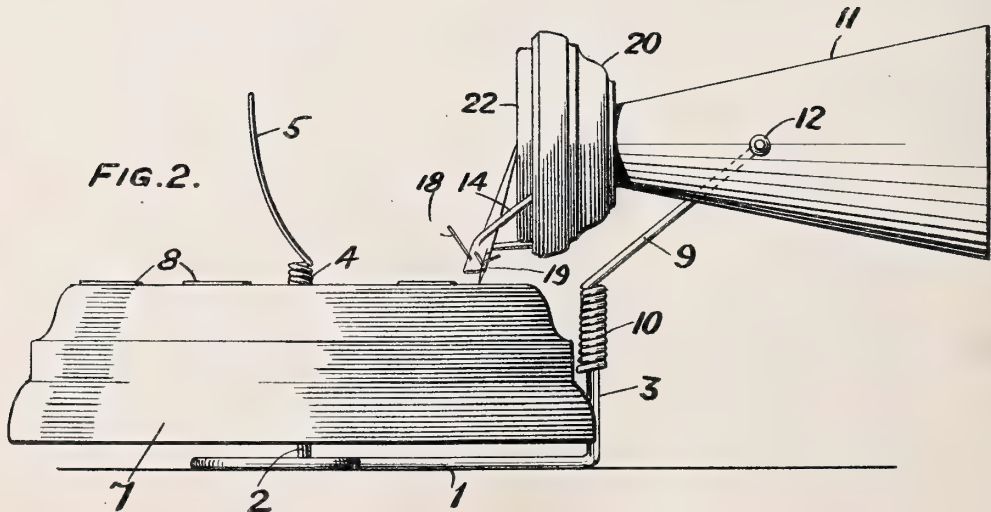
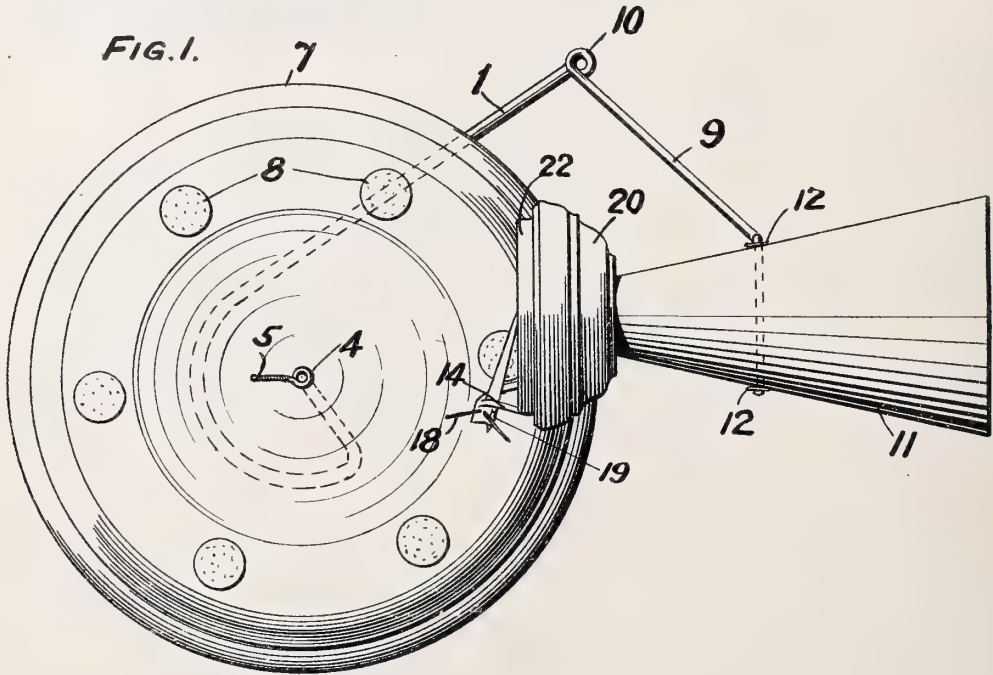
T. J. LITTLE, JR.
TOY PHONOGRAPH.

APPLICATION FILED DEC. 30, 1914. RENEWED DEC. 11, 1915.

1,191,202.

Patented July 18, 1916.

2 SHEETS—SHEET 1.



WITNESSES:

Robt. R. Kitchel.

Frank C. French

INVENTOR

Thomas J. Little, Jr.

BY

Augustus B. S. Doughton.

ATTORNEY.

T. J. LITTLE, JR.
TOY PHONOGRAPH.

APPLICATION FILED DEC. 30, 1914. RENEWED DEC. 11, 1915.

1,191,202.

Patented July 18, 1916.

2 SHEETS—SHEET 2.

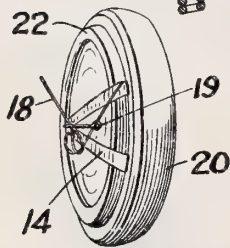
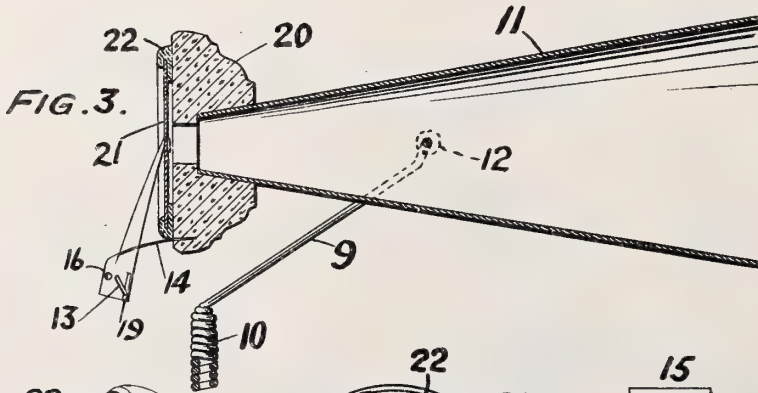


FIG. 4.

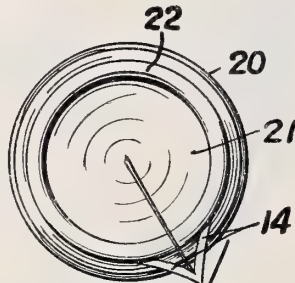


FIG. 5.

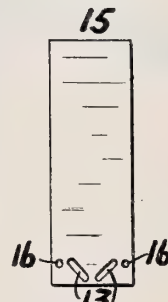


FIG. 6.

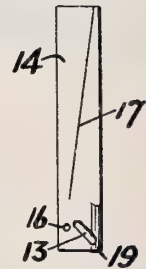


FIG. 7.

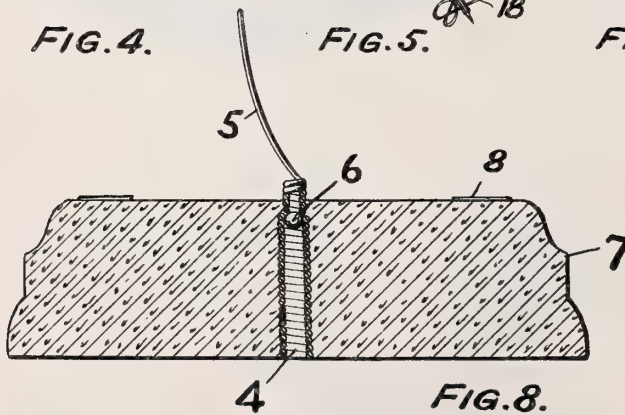


FIG. 8.

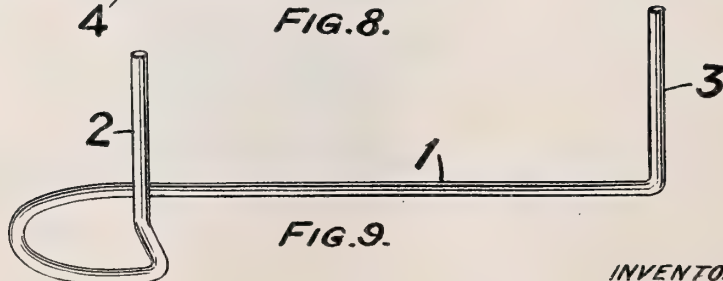


FIG. 9.

WITNESSES:

Robt R. Kitchel.
Frank H. Hunch.

INVENTOR

Thomas J. Little, Jr.
BY *Augustus B. Stoughton.*
ATTORNEY.

UNITED STATES PATENT OFFICE.

THOMAS J. LITTLE, JR., OF WOODBURY, NEW JERSEY, ASSIGNOR TO THE TAUX-WEL TALKING MACHINE CO., A CORPORATION OF NEW JERSEY.

TOY PHONOGRAPH.

1,191,202. Specification of Letters Patent. Patented July 18, 1916.

Application filed December 30, 1914, Serial No. 879,625. Renewed December 11, 1915. Serial No. 66,399.

To all whom it may concern:

Be it known that I, THOMAS J. LITTLE, JR., a citizen of the United States, and a resident of Woodbury, in the county of Gloucester and State of New Jersey, have invented a certain new and useful Toy Phonograph, of which the following is a specification.

The principal object of the present invention is to provide a phonograph so cheap in respect to labor and material that it can be sold and used as a toy.

Accordingly and generally stated the invention comprises the selection and substitution of materials and their combination with simple, inexpensive and efficient parts and elements into a unitary structure comprising a toy phonograph.

The invention will be claimed at the end hereof, but will be first described in connection with the embodiment of it chosen for illustration in the accompanying drawings, in which—

Figure 1, is a top or plan view of a toy phonograph embodying features of the invention. Fig. 2, is a side elevational view of the same. Fig. 3, is a sectional view of the sound box and its accessories. Fig. 4, is a perspective view of the sound box showing the stylus arm. Fig. 5 is a front view of the sound box. Figs. 6 and 7 are views showing the blank, in different stages of manufacture, from which the stylus arm is made. Fig. 8, is a transverse sectional view through the turntable, and Fig. 9, is a perspective view of the base wire.

There is a wire forming a base loop 1 and two upstanding posts 2 and 3. There is also a coiled wire 4 and end 5 constituting a hand-crank. A ball 6 is arranged in the coiled wire and it is held therein by a slight contraction of the convolutions of the coil. The coil 4 is arranged to receive the post 2, the end of which supports the ball 6.

7, is a turn-table as of concrete molded onto the coil 4. Concrete is inexpensive material and it can be readily and cheaply molded so as to be adherent to the coil 4 and it possesses sufficient weight for imparting steadiness in the rotation of the table by hand. However, the surface of the table, where the record is applied, may not be level, as concrete in setting frequently warps and twists. This difficulty is overcome by the use of felt pads 8 spaced apart and applied to the surface of the table.

9 is another wire coiled as at 10 to fit the post 3 and it constitutes a horn support which, of course, is detachable from the post 3 and turnable thereon.

11, is a paper horn carried on the support 9 which passes through it and is properly secured as by washers 12 held in place by expanded or deformed portions of the wire, such as can be produced by pinching it. Since the horn is made of paper it is cheap, while at the same time it assists in the production of proper sound. There is a one-piece sheet metal stylus arm having a cam slot 13 and divergent feet 14.

Inasmuch as the invention is concerned with the production of a toy that must be made and sold cheaply, the construction of the stylus arm should be described.

A blank 15, Fig. 6, is punched to provide the cam slots 13 and openings 16. This blank is then folded on itself and cut diagonally at 17, as shown in Fig. 7. The feet 14 are then bent as shown in Figs. 3 and 4 and 5. There is a spring clip 18, one leg of which is arranged in the cam slot 13 and the other leg of which is arranged through the openings 16. When a needle is inserted in the socket 19, formed in the folding of the blank and communicating with the cam slot 13, it is held by the leg of the clip firmly yet it can be readily removed and replaced by pressing the legs of the clip together.

20, is a sound-box as of concrete and it is carried by the horn 11 and molded to the feet 14. This non-metallic sound box possesses peculiarly advantageous features in respect to the reproduction of sound, imparting to the latter qualities wholly unexpected and unforeseen.

21 is a paper diaphragm connected with the stylus arm as by passing the end of the latter through it and then bending back at the end of the arm. A paper diaphragm advances the general object of the invention and is, moreover, an excellent material in respect to the quality of the sound.

22, is a jelly-like ring of rubber or other elastic material applied to the sound box and in which the edge of the diaphragm is embedded to yieldingly support it in respect to the solid and heavy concrete sound box.

From the foregoing description it is evident that the construction both in respect to cost of material and labor is extremely

simple and inexpensive and well adapted for the production of a toy. Furthermore the choice of materials and their combination with the other elements described enables sound to be reproduced in a manner far better than would be expected and in fact, in a way that is comparable with a real phonograph.

What I claim is:—

10 1. A toy phonograph comprising the combination of a wire forming a base loop and two upstanding posts, a coiled wire with end forming a crank, a ball in the coiled wire adapted to rest on the end of one of
15 said posts, a concrete turn-table molded on said coil and provided with felt buttons, a second wire coiled to fit the end of the other post and constituting a horn support, a paper horn carried by said support, a
20 one-piece sheet metal stylus arm having a cam slot and divergent feet, a spring clip in the cam slot, a concrete sound box carried by the horn and molded to said feet, a paper diaphragm connected with said arm,
25 and a gelatinous ring applied to the sound box and in which the edge of the diaphragm is embedded to yieldingly support and space it.

2. A toy phonograph comprising the combination of a wire forming a base and two
30 upstanding posts, a coiled wire with end forming a crank mounted on one of said posts, a turn-table carried by said coil, a second wire coiled to fit the end of the
35 other post and constituting a support, a horn carried by said support, a stylus arm, and a non-metallic sound box carried by said horn and provided with a diaphragm connected with the stylus arm.

40 3. A toy phonograph comprising the combination of a wire forming a base loop and two upstanding posts, a coiled wire with end forming a crank, a bearing piece in the

coiled wire adapted to rest on the end of one of said posts, a turn-table molded on
45 said coil, a second wire coiled to fit the end of the other post and constituting a horn support, a horn carried by said support, a one-piece stylus arm, a sound box carried by the horn, a diaphragm connected with
50 said arm, and a ring applied to the sound box and in which the edge of the diaphragm is embedded to yieldingly support and space it.

4. A toy phonograph comprising the combination of a wire forming a base loop and two upstanding posts, a turn-table mounted on one of said posts, a horn support detachably and turnably mounted on the other
60 of said posts, a horn carried by said support, a stylus arm having a cam slot and provided with a spring clip coöperating with said slot, a sound box carried by the horn and supporting the stylus arm, a diaphragm connected with the stylus arm, and
65 a ring applied to the sound box and in which the edge of the diaphragm is embedded to yieldingly support and space it.

5. A toy phonograph comprising the combination of a wire forming a base and two
70 upstanding posts, a coiled wire mounted on one of said posts and forming a bearing, a turn-table carried by said coil, a handle rigid with said coil, a second wire coiled to fit the end of the other post and constitut-
75 ing a support, a horn carried by said support, a stylus arm, and a non-metallic sound box carried by said horn and provided with a diaphragm connected with the stylus arm.

In testimony whereof I have hereunto
80 signed my name.

THOMAS J. LITTLE, Jr.

Witnesses:

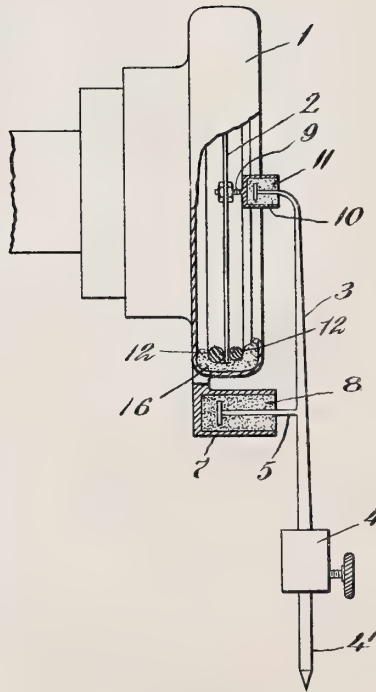
CLIFFORD K. CASSEL,
FRANK E. FRENCH.

METHOD OF CONSTRUCTION OF TALKING MACHINES,
#1,191,674-----P. B. Delany,
Patented-July 18th, 1916.
Filed-October 21st, 1914.

P. B. DELANY.
METHOD OF CONSTRUCTION OF TALKING MACHINES.
APPLICATION FILED OCT. 21, 1914.

1,191,674.

Patented July 18, 1916.



Witnesses:
John J. Kittel
L. F. Browning

Inventor
Patrick B. Delany
By his Attorney
Edward C. Davidson

UNITED STATES PATENT OFFICE.

PATRICK B. DELANY, OF SOUTH ORANGE, NEW JERSEY.

METHOD OF CONSTRUCTION OF TALKING-MACHINES.

1,191,674.

Specification of Letters Patent.

Patented July 18, 1916.

Original application filed July 19, 1913, Serial No. 779,947. Divided and this application filed October 21, 1914. Serial No. 867,709.

To all whom it may concern:

Be it known that I, PATRICK B. DELANY, a citizen of the United States, residing at South Orange, county of Essex, State of New Jersey, have invented a certain new and useful Method of Construction of Talking-Machines, of which the following is a specification.

This invention relates to improved methods of phonograph construction and forms a divisional application from my co-pending application Serial No. 779,947 filed July 19, 1913, and also in part a continuation of my prior application No. 739,939, filed Jan. 3, 1913.

The invention is designed to eliminate scratching or scraping noise from the record and to improve the quality of recordings and reproductions. It is well known that even the smoothest surface revolving under the needle will produce quite a loud or observable noise emitted by the horn or amplifier. It has been found that this is largely due to the method of construction in which a metallic vibrating arm connects the record and the diaphragm of the sound box. Other methods employing vibrating arms of wood, bone or other hard substance also produce the same effect to a modified degree. It has been sought to remedy such defect by rubber or other vibration deadening material interposed at the point of contact between the vibrating arm and the diaphragm; but on account of the elasticity of such materials, or for other reasons, the tone of reproduction has been greatly lowered and modified and, owing to the instability of such materials, particularly under pressure, the instruments soon become out of order.

I have devised a method of mounting the arm whereby metallic connection between the record and diaphragm is entirely severed without appreciable loss of force but with marked suppression of the objectionable scraping sound, the result being a pure and faithful reproduction.

The object of this invention is attained by a method of mounting the arm in cells,

one cell being interposed between the arm and its support and another cell interposed between the arm and the diaphragm, the cells being then filled with a mass of material of suitable density and stability to carry the major or sound producing vibrations, and yet of such character as to suppress or eliminate objectionable extraneous, incidental and minor vibrations that produce the extraneous or scraping sounds in the tones produced by the diaphragm. The material of such mass may be a single material or a compound material composed, for instance, of rubber, asphaltum, tar, waxes of various kinds, etc., or compounds of any two or more of such simple materials.

The invention further comprises features hereinafter set forth.

The drawing is an elevation partly in section of a device constructed in accordance with my improved method.

1 indicates the sound box, 2 the diaphragm, 3 the vibrating arm, 4 the needle holder, and 4¹ the needle.

On each side of the diaphragm is a circular gasket 12. These gaskets and the periphery of the diaphragm are securely held in the sound box by a meltable mass 16, which also firmly cements the gaskets to the diaphragm. In mounting the diaphragm, it is arranged with one or more retaining gaskets in the sound box and the gaskets and diaphragm are fastened to the sound box by the meltable mass while the latter is in a heated plastic condition. When the mass cools it hardens and the diaphragm and gaskets are securely held in place but the diaphragm is insulated from the sound box.

The arm has a lateral bar or rod 5 with a cross-head thereon adapted to be seated in, embedded or surrounded by a mass 8 of material, such generally as hereinbefore described, that absorbs, eliminates or suppresses secondary or minor objectionable vibrations, and is contained in a cell or container 7 attached to or integral with an extension from the sound box. Such a method of mounting the vibrating arm is disclosed

in my application Serial No. 700,394, filed May 29, 1912. The upper portion of the vibrating arm is divided transversely. The end portion 9 is attached to the diaphragm in any ordinary or suitable way and the adjacent ends of the arm are mechanically united by means of a mass or compound 11 that fills a cell or container 10 carried by the end portion 9 of the arm and in which the adjacent portion of the vibrating arm is embedded. Interruption of the continuity of the arm by a body of material acting to suppress or eliminate minor undesirable vibrations therein affords marked improvement in character or quality and purity of tone.

The material, mass or compound used in the practice of this invention is by preference one that becomes soft and even viscous or semi-liquid under the influence of a suitable degree of heat and which at ordinary temperatures—room temperature—becomes and remains “hard”, meaning by that sufficiently rigid or stable to follow the primary vibrations of the arm. This arrangement permits of firm attachment of the inner section of the arm to the diaphragm, and, what is of great importance, while said mass is yet in a plastic state in the process of cooling or setting; the part attached to the diaphragm and the part attached to the support are allowed to assume positions in the connecting masses controlled by the normal position of the diaphragm in its mounting and of the support in its anchorage so that there is no warped or biased strain, a condition practically unavoidable in prior methods of construction and mounting. If, when the different parts are connected, or upon completion of the different mountings, the sound box as a whole be placed for a short time in a temperature sufficient to soften the mass in which the diaphragm and the gaskets are held and which fills the recessed portion of the case or cell, and also the mass in the container in which the arm support is anchored, and the mass in the container comprising the coupling of the parts of the arm, all the parts will yield to a position of unbiased co-ordination and establish a true and highly sensitive vibrating system. This equalization of strain between the various parts permitting them to assume normal unrestrained positions under action of heat forms an important feature of my method of construction.

It is obvious that under ordinary mechanical skill changes could be made without departing from the spirit and scope of the invention. I therefore do not limit myself to the particular structure shown, which discloses only one of the many structures with which my invention may be carried out. In

my copending application for Patent No. 867,710 filed simultaneously herewith I have shown and claimed certain features of the invention which are herein shown but not claimed.

In my copending application No. 779,947 filed July 19, 1913 and No. 867,710 filed Oct. 21, 1914, I have claimed certain subject matter shown in this application but not claimed herein.

No claim is made herein to the apparatus herein shown and described as such subject matter is claimed in my copending application for Patent No. 867,710, filed Oct. 21, 1914.

I claim—

1. The method herein described of connecting parts of the reproducing mechanism of a talking machine, which consists in applying to the juncture of the diaphragm and sound box and to the juncture of metallicly unconnected sections of the stylus arm adjacent the diaphragm, masses of a suitable meltable material inert to vibrations and subjecting the assembled parts to heat, whereby the parts assume normal positions relatively to one another and are so permanently held upon the cooling of the connecting masses.

2. The method herein described of connecting parts of the reproducing mechanism of a talking machine which consists in applying to the juncture of the diaphragm and sound box, of the stylus arm support and the sound box and of the metallicly unconnected sections of the stylus arm adjacent the diaphragm, masses of a suitable meltable material inert to vibrations and subjecting the assembled parts to heat, whereby the parts assume normal positions relatively to one another and are so permanently held upon the cooling of the connecting masses.

3. The method herein described of connecting parts of the reproducing mechanism of a talking machine which consists in applying to the juncture of the metallicly unconnected sections of the stylus arm adjacent the diaphragm and of the arm support and sound box masses of a meltable plastic material inert to vibrations and subjecting the assembled parts to heat for the adjustment of the parts in operative positions.

4. The method herein described of connecting parts of the reproducing mechanism of a talking machine, which consists in applying to the juncture of the diaphragm and the sound-box and to the juncture of the stylus arm and its holder masses of a suitable meltable material inert to vibrations, allowing said masses to harden and then heating the material to a sufficient degree to

allow the diaphragm and stylus arm to relax and find neutral or equalized positions.

5 5. The method herein described of mounting a vibratory diaphragm which consists in arranging the diaphragm with a retaining gasket in a supporting frame and in fastening the diaphragm to the gasket and to the frame by a meltable mass while in a

heated plastic condition but which hardens on cooling.

In testimony whereof, I have hereunto subscribed my name.

PATRICK B. DELANY.

Witnesses:

ANNIE M. DELANY,
LAURISTON BUNKER.

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PHONOGRAPH OR TALKING MACHINE,
#1,191,675-----P.B.Delany,
Patented-July 18th, 1916.
Filed-Oct. 21st, 1914.

P. B. DELANY.
 PHONOGRAPH OR TALKING MACHINE.
 APPLICATION FILED OCT. 21, 1914.

1,191,675.

Patented July 18, 1916.

Fig. 1.

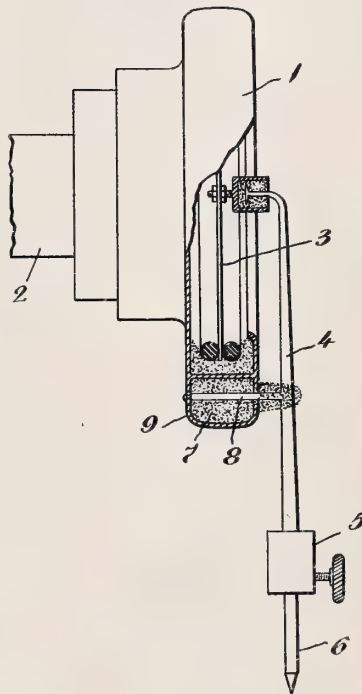


Fig. 2.

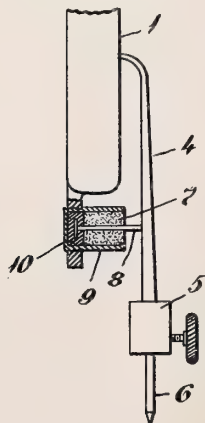
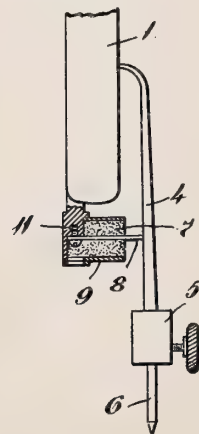


Fig. 3.



Witnesses:
John J. Kittel
L. F. Browning

Inventor
Patrick B. Delany
 By his Attorney
Edward C. Davidson

UNITED STATES PATENT OFFICE.

PATRICK B. DELANY, OF SOUTH ORANGE, NEW JERSEY.

PHONOGRAPH OR TALKING-MACHINE.

1,191,675.

Specification of Letters Patent.

Patented July 18, 1916.

Continuation of applications Serial No. 700,394, filed May 29, 1912, and Serial No. 779,947, filed July 19, 1913. This application filed October 21, 1914. Serial No. 867,710.

To all whom it may concern:

Be it known that I, PATRICK B. DELANY, a citizen of the United States, residing at South Orange, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Phonographs or Talking-Machines, of which the following is a specification.

This invention relates to phonographs or talking machines and to the production of records therefor. Its object is to improve the quality of the musical tones or vocal utterances and to improve the behavior of the apparatus in other respects.

This application is in part a continuation of my former application No. 700,394, filed May 29, 1912, the features of invention shown in Figures 2 and 3 of the present application having been originally shown in my said prior application, while the features of invention shown in Fig. 1 of the present application are also shown in my prior application No. 779,947, filed July 19, 1913.

In the accompanying drawings: Fig. 1 is an elevation partly in section of my improved construction of a reproducer head and needle arm; and Figs. 2 and 3 are similar views showing modifications of the construction.

Referring to Fig. 1, the head is indicated at 1, the sound emitting neck at 2. The diaphragm 3 is mounted within the head in the ordinary way or otherwise and the vibrating arm 4 is shown attached at one end to the diaphragm 3 and carrying at its free end a needle socket 5 adapted to receive a needle 6 to cooperate with the record. The shape of the record is of course immaterial, the device being applicable equally well to a disk, a cylinder or other form of record. Between the vibrating arm 4 and its support, which may be the head or other part, is a means of preventing transmission of vibrations from the arm to the support and vice versa. Such vibrations are absorbed, smothered or suppressed by said means. This means, indicated at 7 is preferably non-metallic and may be a compound of gum, waxes, etc. It should by preference be a tenacious adhesive material or compound, and should be of such character as not to respond to and transmit the vibrations in question. Moreover it should be preferably of such a nature that its characteristics with respect to hardness and vibratility will not

vary materially with ordinary changes of temperature. A suitable material for the purposes specified consists of one part by weight of Stockholm tar, one part by weight of resin and three parts by weight of gutta-percha. The supporting rod 8 for the vibrating arm, as shown in Fig. 1, extends entirely through this compound and is secured to the end wall of the container 9 which in this particular construction is a continuation of the wall of the sound box. In this preferred form, the rod 8 where it projects from the container 9 is coated with the compound which extends also over and around the juncture of the rod with the body of the vibrating arm 4. This particular arrangement has been found by experience to aid in the production of pure tones. It will be noticed that this construction provides for what is substantially a flexible, yielding fulcrum for the vibrating arm 4 as the rod 8 is secured to the container. It will further be noticed that the effect of the mass surrounding the rod 8 and its juncture with the arm 4 will be to dampen any lateral vibrations of rod 8 and it will also either prevent or absorb any local vibrations set up either in rod 8 or at the juncture of rod 8 and arm 4 while permitting the arm 4 to vibrate with the juncture operating to some degree as a nodal point. By means of this construction, the arm 4 is substantially supported without the supporting means modifying or injuring the record tones by the setting up of secondary or local vibrations; or, in other words, the construction, while simpler and more substantial, results in purer tones than have been secured up to the present time.

In Fig. 2, the container 9 has fixed in its bottom a block 10 of vulcanite, vulcanized fiber or like hard substance in which the end of rod 8 is secured and around the arm within the container is placed the vibration absorbing material 7.

The structure shown in Fig. 3 is similar in all essential features to that shown in Fig. 1, in that the rod 8 extends from the arm 4 through a cell or container 9, is surrounded by the mass 7 and has its end rigidly secured by a screw 11 or otherwise to an extension forming part of the sound box or head. In this case as in the other views, the salient features of the invention are embodied, the head being in rigid con-

nection with the rod 8 which is also surrounded by and is in contact with the mass 7 located within the container 9.

5 The manner of securing the diaphragm 3 to the head 1 forms no part of the present invention, it being claimed in my co-pending application.

10 A large variety of vibration absorbing materials or masses may be used—mixtures of Stockholm tar, resins, gutta percha, etc., have been found very satisfactory.

15 No claim is made herein to the method described as claims to such method are made in my application for Patent No. 867,709 filed Oct. 21, 1914.

I claim—

20 1. The combination of a diaphragm, its head, a coöperating vibrating arm, a support for said arm rigidly attached thereto and projecting laterally therefrom and attached directly to the head, and a fixed plastic mass inert to vibrations and embracing the sides of said support.

25 2. The combination of a diaphragm, a co-operating vibrating arm, a container fixed

relatively to the diaphragm, a meltable mass of material inert to vibrations disposed within the container and a rod embedded in said mass with its ends rigidly attached respectively to the container and to said arm. 30

3. The combination of a diaphragm, its actuating member, a supporting rod rigidly attached at one end to said member and its other end rigidly secured to a support fixed relatively to the diaphragm and a meltable 35 mass of material inert to vibrations embracing said supporting rod.

4. The combination of a diaphragm, its actuating member, a supporting rod rigidly attached at one end to said member, and 40 means acting upon the juncture of said member and rod to deaden or absorb the vibrations thereof.

In testimony whereof, I have hereunto subscribed my name.

PATRICK B. DELANY.

Witnesses:

ANNIE M. DELANY,
LAURISTON BUNKER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND REGULATOR,

#1,191,808-----A. G. Marquis,

Patented-July 18th, 1916.

Filed-Apr. 12th, 1915.

A. G. MARQUIS.
SOUND REGULATOR.
APPLICATION FILED APR. 12, 1915.

1,191,808.

Patented July 18, 1916.

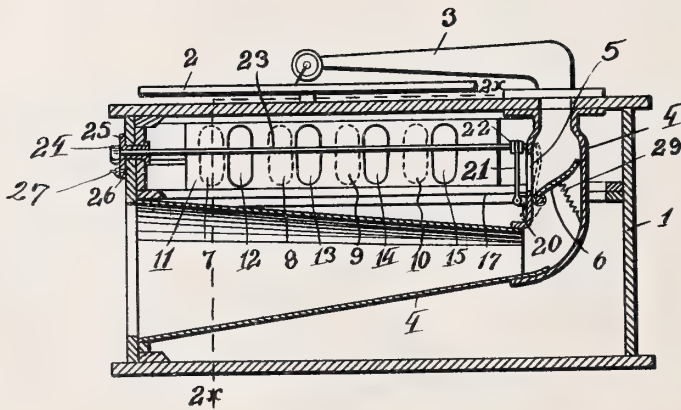


Fig. 1.

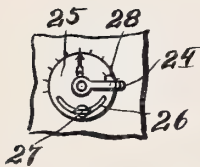


Fig. 3.

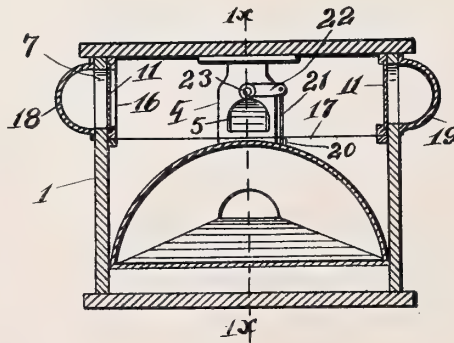


Fig. 2.

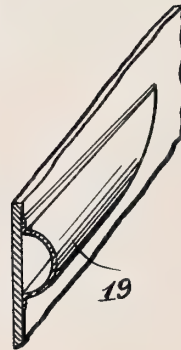


Fig. 4.

Witnesses

Eric Schinger.
Eleanor M. Corcoran.

Inventor

Alexander G. Marquis

By Frank Kiefer
Attorney

UNITED STATES PATENT OFFICE.

ALEXANDER G. MARQUIS, OF ROCHESTER, NEW YORK, ASSIGNOR OF ONE-FOURTH TO GEORGE W. ROGERS AND ONE-FOURTH TO ANITA B. ROGERS, BOTH OF ROCHESTER, NEW YORK.

SOUND-REGULATOR.

1,191,808.

Specification of Letters Patent.

Patented July 18, 1916.

Application filed April 12, 1915. Serial No. 20,702.

To all whom it may concern:

Be it known that I, ALEXANDER G. MARQUIS, a subject of the King of Great Britain, residing at Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Sound-Regulators, of which the following is a specification.

The object of this invention is to provide a new and improved device for varying the volume of sound produced more especially by a talking machine or for reducing and suppressing a part of the sound so as to prevent confusion and interference of the sound waves. This and other objects of the invention will be fully illustrated in the drawings, described in the specification and pointed out in the claims at the end thereof.

In the drawings, Figure 1 is a vertical section through a talking machine of the disk record type showing my improvement embodied therein, the section being taken on the line 1^x—1^x of Fig. 2. Fig. 2 is a section on the line 2^x—2^x of Fig. 1. Fig. 3 is an elevation of a handle for operating the valve. Fig. 4 is a perspective view of one of the auxiliary silencing chambers on the side of the cabinet.

In the drawings like reference numerals indicate like parts.

In the drawings reference numeral 1 indicates the cabinet of a disk record talking machine on which is mounted to rotate the platen 2 on which the disk is supported and the overhanging arm 3 that carries the diaphragm and needle point. Inside of the cabinet is a sounding horn 4 which extends downward and forward. The vertical part of this horn is cut away at 5 to provide an opening and adjacent to this opening is pivoted in the horn a valve 6 that is adapted to close the opening when in one position or is adapted to close the vertical passage in the horn when it is in another position, the valve being capable of being set in any position intermediate of these two extreme positions. This valve operates to deflect the sound as it passes down through the vertical part of the horn and the sound is deflected thereby in proportion to the extent that the valve is moved to the right in Fig. 1, the valve operating to intercept the sound waves and deflect them through the opening 5 so that the transmission of the sound waves below the valve is correspondingly reduced

and the sound produced thereby is correspondingly less. The waves that are intercepted by the valve 6 are thrown outside of the horn and into the cabinet above the horn where they have little or no disturbing effect and are not thrown back toward the diaphragm where they would cause interference with the oncoming sound waves produced by the diaphragm, interfering with the quality of the sound or tone produced by the diaphragm, as is at present the case with the devices now in use. The valve is preferably shaped so that when placed in full line position it will completely close the vertical passage in the horn and reduce the sound produced by the instrument to a minimum which reduction however, will be secured without any impairment of the quality of the sound.

To vary the effect which the valve has on the sound I provide a series of openings in one or both sides of the cabinet which openings are illustrated at 7, 8, 9 and 10 in Fig. 1. Mounted to slide in the cabinet adjacent to this opening is the plate 11 having corresponding openings 12, 13, 14 and 15 therein, which openings may be placed wholly in or out of register with the openings in the cabinet or in any intermediate positions between these extremes for the purpose of modifying the effect of the sound waves deflected into the cabinet by the valve 6. To still further modify or dampen the sound waves I provide a screen or diaphragm of any thin cloth or other suitable material for covering the openings 7, 8, 9 and 10. The use of a cloth diaphragm will diminish the sound or silence it completely, while the use of a metal or parchment diaphragm will augment or change the timbre of some of the sounds. A similar screen or diaphragm 17 is stretched across the cabinet to separate the upper part of the cabinet into which the sound waves are deflected from the lower part of the cabinet which contains the horn.

On the outside of the cabinet is placed the auxiliary silencing chambers 18 and 19. It will be understood that openings through the cabinet lead into the chamber 19 and that a slide and screen is provided for controlling said openings just as has already been explained in connection with the silencing chamber 18. The silencing chambers 18 and 19 taper from the front to the rear

and may be open or closed at the front as may be desired.

The valve 6 is operated as follows: To the bottom of the valve is fastened a crank 20 to which in turn is connected a link 21 which link connects to a crank 22 on the shaft 23 which runs to the front of the machine and thence extends through the front of the cabinet. A handle 24 is fastened to this shaft at the front of this cabinet by which the shaft may be rocked so as to open or close the valve. Concentric with the shaft 23 is a disk 25 having a segmental slot 26 therein in which engages a clamping screw 27 by which this disk may be set in any angular position desired. On this disk is carried a lug 28 which serves to arrest the handle 24. Connected to the valve 6 is a spring 29 which spring operates to draw the valve open and the valve may be arrested in any intermediate position or held closed by shifting the disk 25 and clamping it in position so that the lug 28 will arrest the handle 24 at the desired point.

As shown in Fig. 2 the horn used in connection with my apparatus is preferably arched at the top and flat at the bottom.

I claim.

1. In a sound producing apparatus the combination of a horn and a valve mounted in the side of the horn covering an opening in the side of the horn, said valve being adapted to be moved across the horn so as to uncover the opening in the side of the horn and close the passage through the horn, a chamber communicating with said opening to receive the waves of sound so deflected, and diaphragms in said chamber to modify the sound waves deflected into said chamber.

2. In a sound producing apparatus the combination of a horn and a valve mounted in the side of the horn covering an opening in the side of the horn, said valve being adapted to be moved across the horn so as to uncover the opening in the side of the horn and close the passage through the horn, and a muffling chamber separate from said horn to receive and silence the waves of sound so deflected.

3. In a sound producing apparatus the combination of a horn and a valve mounted in the side of the horn covering an opening in the side of the horn, said valve being adapted to be moved across the horn so as to uncover the opening in the side of the horn and close the passage through the horn and a muffling chamber adjacent to said opening to receive and silence or modify the waves of sound so deflected, openings in said muffling chamber, a valve for varying the size of said openings and an auxiliary muffling chamber outside of said openings.

4. In a sound producing apparatus the combination of a horn and a valve mounted

in the side of the horn covering an opening in the side of the horn, said valve being adapted to be moved across the horn so as to uncover the opening in the side of the horn and close the passage through the horn, and a muffling chamber separate from said horn to receive and silence the waves of sound so deflected, openings in said muffling chamber and a valve for varying the size of said openings.

5. In a sound producing apparatus the combination of a horn and a valve mounted in the side of the horn covering an opening in the side of the horn, said valve being adapted to be moved across the horn so as to uncover the opening in the side of the horn and close the passage through the horn and a muffling chamber adjacent to said opening to receive and silence or modify the waves of sound so deflected, openings in said muffling chamber, a valve for varying the size of said openings and a screen in combination with said valve openings.

6. In a sound producing apparatus the combination of a horn and a valve mounted in the side of the horn covering an opening in the side of the horn, said valve being adapted to be moved across the horn so as to uncover the opening in the side of the horn and close the passage through the horn, and a muffling chamber separate from said horn adjacent to said opening to receive and silence the waves of sound so deflected, and devices connected to said valve and extending to the outside of said muffling chamber to permit the operation of the valve from the outside of the chamber and hold said valve in either of its extreme positions or at points intermediate thereof.

7. In a sound producing apparatus the combination of a horn and a valve mounted in the side of the horn covering an opening in the side of the horn, said valve being adapted to be moved across the horn so as to uncover the opening in the side of the horn and close the passage through the horn and a muffling chamber adjacent to said opening to receive and silence or modify the waves of sound so deflected, and devices connected to said valve and extending to the outside of said muffling chamber to permit the operation of the valve from the outside of the chamber and hold said valve in either of its extreme positions or at points intermediate thereof, said devices including a rock shaft extending through the casing, a handle fastened to said rock shaft, a plate concentric with said shaft and having a stop thereon to arrest said handle, means for holding said plate with its stop in different positions, and means for moving the valve to hold the handle against said stop.

8. In a sound producing apparatus the combination of a horn and a valve mounted in the side of the horn covering an opening

in the side of the horn, said valve being adapted to be moved across the horn so as to uncover the opening in the side of the horn and close the passage through the horn, 15
5 a chamber separate from said horn communicating with said opening to receive the waves of sound so deflected, openings in said chamber, and a sliding shutter for opening or closing said openings.
10 9. A sound producing apparatus comprising a cabinet having a revolving platen on the top thereof, a tone-arm extending rearwardly over said platen and down into the cabinet, a horn extending outwardly in the lower part thereof, a muffling chamber 15 located in said cabinet and separate from said horn, an opening in said horn communicating with said chamber, and a valve mounted in the horn for uncovering said opening and closing the passage through the 20 horn.

In testimony whereof I affix my signature in presence of two witnesses.

ALEXANDER G. MARQUIS.

Witnesses:

ELEANOR M. CORCORAN,
EDNA K. BOOTH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

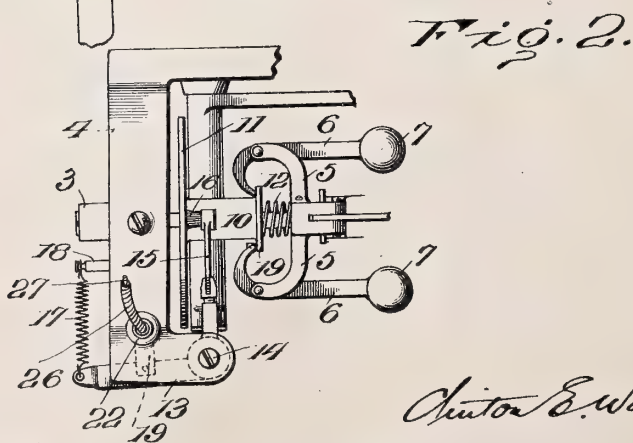
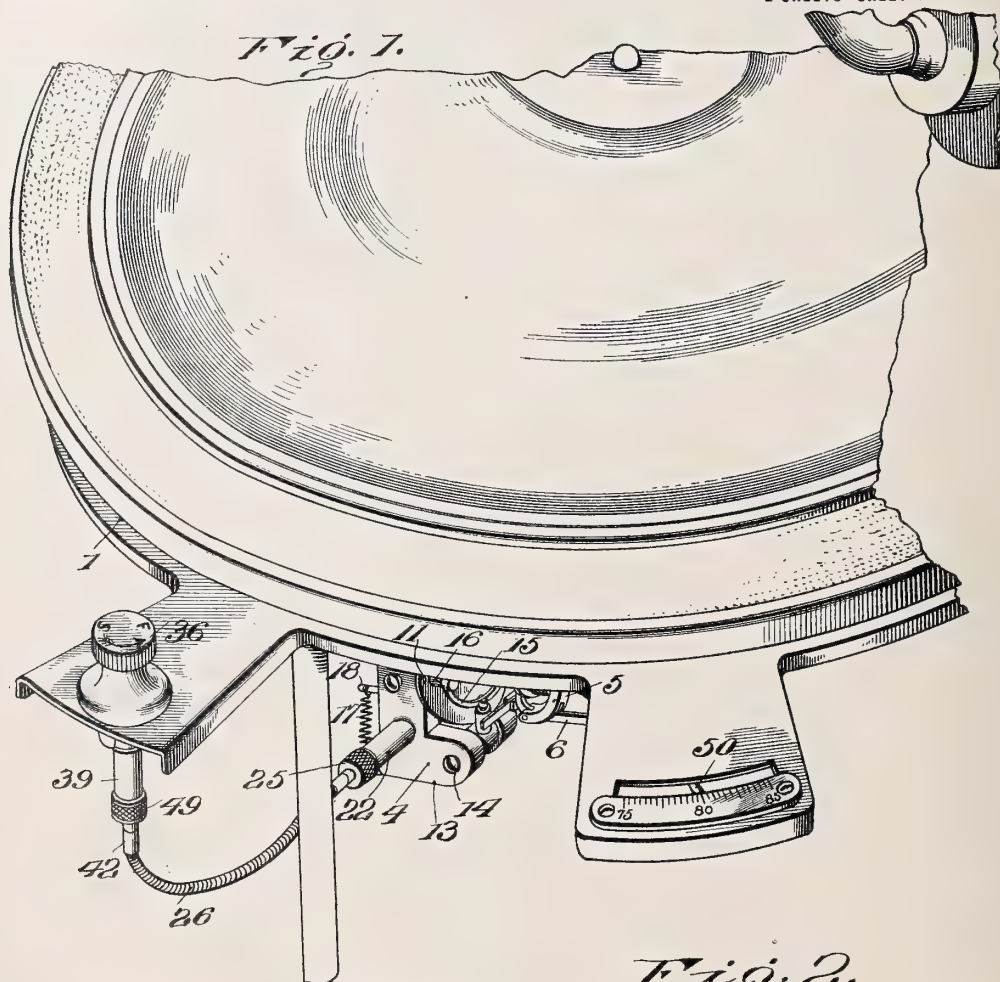
SPEED GOVERNOR

#1,192,026-----C.E.Woods,
Patented-July 25th, 1916.
Filed-August 30th, 1913.

C. E. WOODS.
SPEED GOVERNOR.
APPLICATION FILED AUG. 30, 1913.

1,192,026.

Patented July 25, 1916.
2 SHEETS—SHEET 1.



Inventor

Witnesses
James H. Anderson
Ruth C. Fitzhugh.

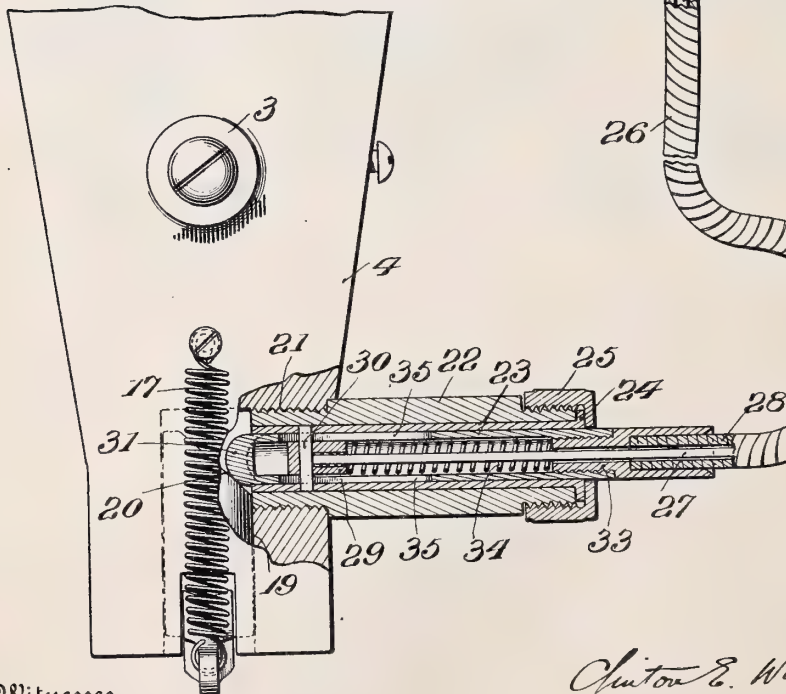
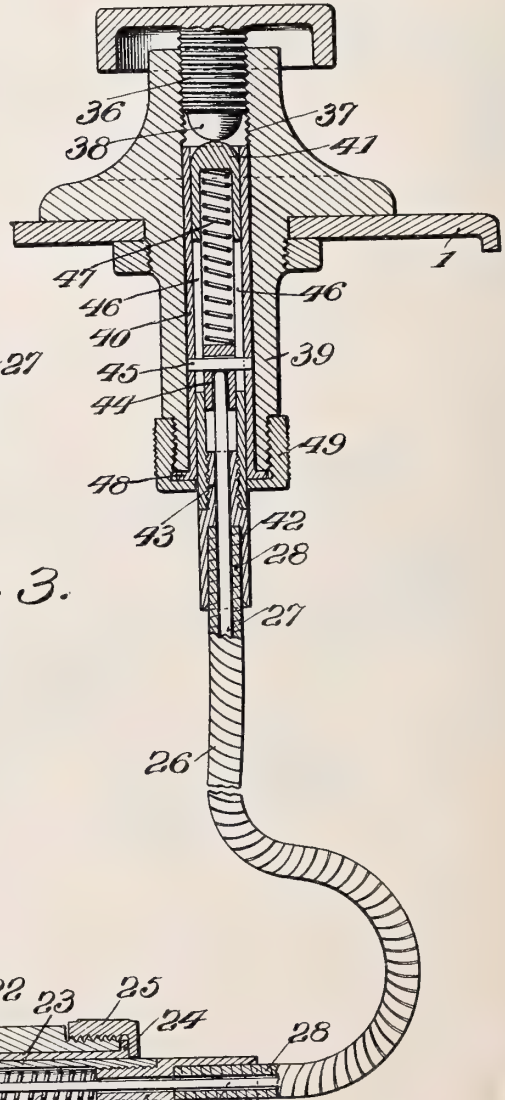
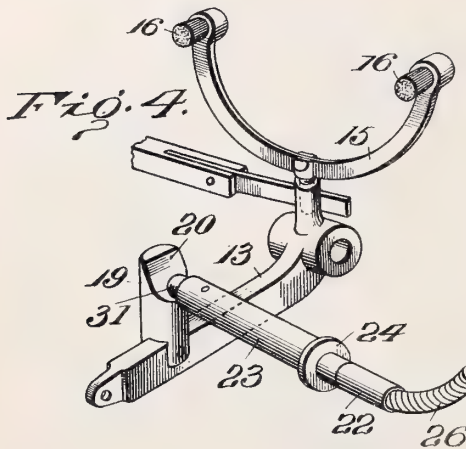
Charles E. Woods,
By Mauro, Cameron, Lewis & Massie
Attorneys

C. E. WOODS.
SPEED GOVERNOR.
APPLICATION FILED AUG. 30, 1913.

Patented July 25, 1916.

2 SHEETS—SHEET 2.

1,192,026.



Inventor

Clinton E. Woods.

Witnesses
James H. Anderson
Ruth C. Fitzhugh

By *Mauro, Cameron, Lewis & Massey*
Attorneys

UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT.

SPEED-GOVERNOR.

1,192,026.

Specification of Letters Patent.

Patented July 25, 1916.

Application filed August 30, 1913. Serial No. 787,460.

To all whom it may concern:

Be it known that I, CLINTON E. WOODS, of Bridgeport, Connecticut, have invented a new and useful Improvement in Speed-Governors, which invention is fully set forth in the following specification.

This invention relates especially to speed governors for the motor mechanism of talking machines, although as to some of its broader features it is not limited to the speed governor part of a talking machine. Heretofore in such speed governors it has been proposed to mount centrifugally actuated weights upon a shaft driven by the motor, which weights under centrifugal action serve to move a disk into contact with a friction pad or pads, and the speed of the motor has been governed by adjusting the position of the friction pads by means of a micrometer screw acting through a complicated set of lever mechanism.

The present invention has for its object to eliminate such lever mechanism and substitute therefor a flexible member which may be more cheaply manufactured, readily assembled, and which shall more directly transmit the action of the micrometer screw to adjust the position of the friction pads with relation to the cooperating disk controlled by the centrifugal weights. The inventive idea involved is capable of receiving a variety of mechanical expressions, one of which, for the purpose of illustrating the invention, is shown in the accompanying drawings, but it is to be understood that such drawings are for the purpose of illustration only and are not designed to define the limits of the invention, reference being had to the appended claims for this purpose.

In said drawings:—Figure 1 is a broken perspective view of a talking machine with my invention applied thereto; Fig. 2 is a detail side elevation; Fig. 3 is a vertical sectional view; and Fig. 4 is a detail perspective, showing the means for applying the action of the flexible member to the friction pad support.

Referring to the drawings, in which like reference numerals indicate like parts, 1 is the motor-board of a talking-machine, which board may be of any suitable or desired construction and which supports on its under side a motor (not shown) of any suitable form, said motor being provided with a speed governor, part of which is shown in

Fig. 2 in position under the motor-board 1. The motor-board 1 is formed of thin sheet-metal and is therefore more or less liable to deflection or distortion under stress. A shaft 3, Fig. 2, driven by the motor and having bearing in a bracket 4 depending from the motor-board 1, is provided with bracket arms 5, 5, secured to and revolving with the shaft 3, in which bracket arms are pivoted levers 6, 6, provided with centrifugal weights 7, 7, at one end, while the other ends of said levers are intumed and engage a collar 9 on a sleeve 10 keyed to but slidably mounted on the shaft 3 and provided at one end with a disk 11, said sleeve bearing at the end where the collar 9 is located against a spring 12 surrounding the shaft and reacting against a fixed abutment thereon. Mounted on a bell-crank lever 13, fulcrumed at 14, is a fork 15, Fig. 4, bearing two friction pads 16, 16, in position to be contacted by the disk 11 when the motor is in operation. A spring 17, Fig. 2, engages the outer end of one arm of the bell-crank lever 13 and is anchored at the other end to a lug 18 projecting from the bracket 4, said spring tending to elevate the arm of the bell-crank lever 13 to which it is attached and to thus throw the pads 16 away from the disk 11.

The construction thus far described forms no part of the present invention, which invention resides in the means for controlling the rocking action of the bell-crank lever 13 on its pivot 14 to adjust the position of the friction pads 16 with relation to the disk 11, which invention will now be described more in detail.

Referring to Fig. 4, 19 is an upwardly projecting pin or lug on the arm 13 of the bell-crank lever, which pin has a cam surface 20 on its upper end, and immediately opposite said cam surface a screw-threaded opening 21 is formed in the bracket arm 4 into which is inserted a screw-threaded sleeve 22. Within said sleeve is a lining tube 23 having a flange 24 at its outer end abutting the end of the sleeve 22, said lining tube being held in position by a cap 25 screw-threaded onto the outer end of the sleeve 22. 26 is a flexible member known in the art as a "Bowden wire", which consists of a central core of wire 27 surrounded by a closely coiled wire 28, the whole being so constructed that the two parts 27 and 28 are capable of movement the one relatively

to the other, that is, the outer coil of wire 28 may be caused to slide upon the inner core of wire 27, or the inner core of wire 27 may be caused to slide within the outer coil of wire 28. As shown in the drawings, the inner wire 27 is exposed for a considerable distance at each end, that is, the outer coil 28 does not extend entirely to the ends, and at the end adjacent to the speed governor nor the inner wire 27 is anchored by solder or otherwise to a circular block of metal 29 and a pin 30 extends through said block and into the lining tube 23, so that the block 29, and with it the end of the core wire 27, is anchored to said tubular lining 23 and is therefore incapable of movement with relation thereto. The outer coil or sheath wire 28 is secured to a plunger 31 having a beveled or rounded nose in operative contact with the cam face 20 on the upwardly projecting pin 19 secured to the pad-operating lever 13, so that when movement is imparted to the sheath or coil 28, as hereinafter described, it actuates the plunger in a direction from right to left, Fig. 3, and depresses the outer end of the bell-crank lever 13 against the tension of the spring 17, thereby moving the friction pads 16, 16, toward the governor disk 11. Various means may be employed for securing the outer sheath 28 to the plunger 31. As here shown, the sheath or coil 28 is inserted in and secured in any suitable manner within a cup 32 having a screw-threaded tubular base 33 with the core wire 27 extending therethrough. This cup is screw-threaded into a tubular extension of the plunger 31 with a coiled spring 34 surrounding the core wire 27 and reacting between the plug 29 and the screw-threaded base 33 of the cup 32. The tubular portion of the plunger 31 is provided with two slots 35, 35, through which the pin 30 extends so that the plunger 31 is enabled to move past the pin 30, as will be readily understood.

Referring to Figs. 1 and 3, 36 is a micrometer screw mounted in a screw-threaded socket 37 mounted on the motor-board 1, as clearly shown in Fig. 1. Said micrometer screw has a rounded head 38, Fig. 3. 39 is a tubular sleeve secured in any suitable manner to the under side of the motor-board 1, and immediately beneath and in vertical alinement with the screw-threaded socket 37, within the sleeve 39, is a lining tube 40 extending entirely through the sleeve and the motor-board 1 and upwardly into proximity with the screw-threaded socket 37 of the micrometer screw 36. Within the tubular lining 40 is a plunger 41 having a curved or rounded end in contact with the curved head 38 of the micrometer screw 36, said tubular plunger head being secured at its lower end to the sheath coil 28 of the Bowden wire by means

of a cup 42, into which said sheath extends and to which it is soldered or otherwise secured, said cup being provided with a base 43 screw-threaded into the lower end of the tubular plunger 41. The exposed end of the core wire 27 of the Bowden wire extends through said screw-threaded base or plug 43 and is soldered or otherwise secured to a block 44 secured by a pin 45 to the walls of the tubular lining 40, and the plunger 41 is provided with two slots 46, 46, to enable the plunger to move over and with relation to the pin 45. A spring 47 is located in the hollow plunger 41 between the upper end of the block 44 and the upper interior wall of the plunger 41, the action of said spring being to normally force the plunger upward into operative relation with the head 38 of the micrometer screw 36. The tubular shell 40 is provided at its lower end with a flange 48 and is held in position within the sleeve 39 by a cap 49 screwed onto said sleeve.

The operation of the device is as follows: As is usual in speed governors of the character herein described, reference being had particularly to Fig. 2, the speed of the machine will be checked by moving the pads 16 to the left in said figure (that is toward the disk 11) and will be permitted to increase by moving said pads 16 to the right in said figure (that is away from the disk), and this is accomplished by the present invention through the manipulation of the micrometer screw 36. In order to check the speed of the motor, the micrometer screw is screwed downward, thereby imparting downward movement to the plunger 41, which movement is transmitted through said plunger to the outer or sheath wire 28 of the Bowden wire, and this in turn produces a thrust from right to left, in the lower part of Fig. 3, on the plunger 31 which, acting on the cam 20, serves to depress said cam and the pin 19, thereby rocking the bell-crank lever 13 so as to cause the friction pads 16, 16, to move toward the friction disk 11, this action serving to increase the tension on springs 34 and 47. By shifting the pads 16 nearer to the disk 11, said disk will be caused to contact with the pads at a lower speed than was the case before the pads were shifted, and hence will act to prevent the machine from reaching as high a speed as was obtained before the pads were shifted. If, on the other hand, it is desired to increase the speed of the machine, the micrometer screw is turned so as to cause the screw to move upward in its screw-threaded socket 37 and the spring 17, acting through the lever 13 and the cam face 20 on the pin 19, forces the plunger 31 from left to right in Fig. 3, which movement is transmitted through the outer sheath wire 28 of the Bowden wire to the plunger 41, the tension

of the springs 34 and 47 being thereby decreased.

It will be seen that by the present invention, even the slightest movement of the micrometer screw 36 will be transmitted to the friction pads without any lost motion of any kind, such as would be liable to occur through lever mechanism and the wearing of bearings, etc., and that the entire transmission device, outside of the couplings, is embraced in a single flexible Bowden wire. By this means a very fine adjustment of the parts may be readily secured, the operator being able to determine the speed by means of any suitable speedometer, indicated at 50 on Fig. 1.

As before stated, the motor-board 1 is formed of thin sheet-metal. The holes by means of which the bracket 4 and the socket 37 are secured to the motor-board are located as accurately as possible; but it is well known that, in the fabrication of sheet-metal devices, it is extremely difficult, if not in fact impossible to punch or drill holes with mathematical accuracy of location. Because of possible unavoidable inaccuracies in the locations of the apertures in the motor-board, or because of distortion of the motor-board, the relative positions of the bracket 4 and the socket 37 may vary slightly from the true predetermined positions. The Bowden wire 26 which is provided for connecting these two parts permits such minor variations in positions to occur without in any way affecting the efficiency of the apparatus, the Bowden wire because of its flexibility accommodating itself to said socket and bracket.

It will be clear from the drawings that the talking machine motor and the governor therefor are connected to the motor-board entirely independently of the adjusting device which includes the screw 36. Inasmuch as these parts are separately connected to the motor-board, and inasmuch as the motor-board itself is made of thin sheet metal and is therefore more or less flexible, it is impossible to so position the governor and the adjusting device that they maintain a mathematically exact predetermined relationship to each other. There may be variations due to errors in assembling or to bending of the metal of the motor-board, and the Bowden wire being flexible compensates for these variations, always maintaining a complete operative connection.

While, for the purpose of enabling the invention to be understood, the same has been described with considerable particularity and exactness as to the details of construction, proportions and relative arrangements of parts, it is to be understood that the invention is not necessarily limited to such proportions, details and relative arrangements, since the same may be varied within

the limits of the appended claims, without departing from the invention.

What is claimed is:—

1. In a talking-machine, the combination of a speed governor for the motor, a screw for adjusting the same, a fixed threaded socket engaged by the screw, and means including a Bowden wire for transmitting the movement of the screw to the governor.

2. In a talking-machine, the combination of a speed governor for the motor comprising a friction disk and a coating friction device, with a screw for adjusting the relation of said coating device to said disk, a fixed threaded socket engaged by the screw, and means including a Bowden wire for transmitting the movement of the screw to said coating friction device.

3. In a talking-machine, the combination of a speed governor for the motor comprising a motor-driven friction element and a coating friction device, with a screw for adjusting the relation of said parts to each other, a fixed threaded socket engaged by the screw, and means including a Bowden wire for transmitting the movement of the said screw to one of said parts to effect corresponding changes in the speed of the motor.

4. In a talking-machine, the combination of a speed governor for the motor comprising a disk revolved by the motor and having translatory movement imparted thereto by centrifugal action and a friction pad co-acting with said disk, with means for adjusting the relation of said pad with said disk, said means including a Bowden wire having one end in operative relation with the pad mounting, a screw in operative relation with one element of said wire for moving it with relation to the other element, and a fixed threaded socket engaged by the screw.

5. In a talking-machine, the combination of a speed governor for the motor comprising two members adjustable with relation to each other to control the speed of the motor, a Bowden wire having one end in operative relation with one of said members, and an adjusting device in operative relation with the other end of said Bowden wire and comprising a screw and a fixed threaded socket therefor, whereby movement of said screw is transmitted by said Bowden wire to adjust the relation between the members of the speed governor.

6. In a talking-machine, the combination of a speed governor for the motor, an adjusting screw and a fixed threaded socket engaged by the screw, with a Bowden wire in operative relation with said screw and governor.

7. In a talking-machine, the combination of a speed governor for the motor and an adjusting screw, with a Bowden wire having

its inner member anchored against longitudinal movement, the outer member being in operative relation at one end with said screw and at the other end with the said governor.

5 8. In a talking-machine, the combination of a speed governor for the motor, and an adjusting screw, with a Bowden wire having both ends of its inner member anchored against movement and one end of its outer
10 member in operative relation with said screw and the other end in operative relation with the governor.

9. In a talking machine, the combination of a horizontal thin sheet-metal motor-board,
15 a motor, an adjustable governor for the motor secured to the motor-board, an adjusting device secured to the motor-board independently of the governor, and a Bowden wire engaged at one end with the governor
20 and at the other end with the adjusting device to transmit movement from the latter to the former, the said Bowden wire serving on account of its flexibility to compensate for possible inaccuracies in the relative locations of the governor and the adjusting
25 device.

10. In a talking machine, the combination of a horizontal thin sheet-metal motor-board, a turn-table above the motor-board, a motor,
30 an adjustable governor for the motor secured to the lower side of the motor-board beneath the turn-table, an adjusting device secured to the motor-board independently of the governor and projecting above the motor-board at one side of the turn-table, and a
35 Bowden wire engaged at one end with the governor and at the other end with the adjusting device to transmit movement from the latter to the former, the said Bowden
40 wire serving on account of its flexibility to compensate for possible inaccuracies in the relative locations of the governor and the adjusting device.

11. In a talking machine, the combination
45 of an adjustable speed governor, an adjusting device, a Bowden wire having one end of its movable element engaging the governor and the other end normally engaging the movable element of the adjusting device, the
50 said movable elements being freely separable, and a spring tending to hold the movable element of the wire in engagement with the movable element of the adjusting device.

12. In a talking machine, the combination
55 of an adjustable speed governor, an adjusting device, a Bowden wire having one end of its movable element engaging the governor and the other end normally engaging the movable element of the adjusting device,
60 the said movable elements being freely separable, and two springs positioned respectively at the ends of the movable element of the wire and each tending to hold the movable element of the wire in engagement with
65 the movable element of the adjusting device.

13. In a talking machine, the combination of an adjustable speed governor, an adjusting device comprising a manually rotatable screw, a Bowden wire having one end of its movable element engaging the governor and
70 the other end normally engaging the screw, the said movable element and screw being freely separable, and a spring tending to hold the movable element of the wire in engagement with the screw.

14. In a talking machine, the combination of an adjustable speed governor, an adjusting device comprising a manually rotatable screw having a rounded end, a Bowden wire
75 having one end of its movable element engaging the governor and its other end rounded and normally engaging the screw, the said rounded ends being freely separable, and a spring tending to hold the rounded
80 end of the wire in engagement with the rounded end of the screw.

15. In a talking machine, the combination of a speed governor having a movable adjusting element, an adjusting device, a Bowden wire having one end of its movable
85 element engaging the adjusting device and its other end normally engaging the movable element of the governor, the said movable elements being freely separable, and a spring tending to hold the movable element of the
90 governor in engagement with the movable element of the wire.

16. In a talking machine, the combination of a speed governor having a pivoted adjusting lever provided with a cam face at an
95 angle to the pivotal axis, an adjusting device, a Bowden wire having one end of its movable element engaging the adjusting device and its other end normally engaging the cam face of the lever, the said cam face
100 and movable element being freely separable, and a spring tending to hold the lever with its cam face in engagement with the movable element of the wire.

17. In a talking machine, the combination
110 of a speed governor having a movable adjusting element, an adjusting device, a Bowden wire having one end of its movable element normally engaging the movable element of the adjusting device and its other end
115 normally engaging the movable element of the governor, each of the said movable elements being freely separable from the next, a spring tending to hold the movable element of the wire in engagement with the movable
120 element of the adjusting device, and a spring tending to hold the movable element of the governor in engagement with the movable element of the wire.

18. In a talking machine, the combination
125 of an adjustable speed governor, an adjusting device, and a Bowden wire having one end in engagement with the adjusting device and the other end in engagement with the governor, the ends of both elements of
130

the Bowden wire being freely detachable from the said adjusting device and the said governor respectively.

19. In a talking machine, the combination of an adjustable speed governor, an adjusting device, a Bowden wire having its outer element movable and in engagement at one end with the governor and at the other end with the adjusting device, and means for anchoring the inner element of the wire against movement with the outer element.

20. In a talking machine, the combination of an adjustable mechanism, an adjusting device, a Bowden wire having one end of its movable element engaging the adjustable mechanism and the other end engaging the movable element of the adjusting device, the said movable elements being freely separable, and a spring tending to hold the movable element of the wire in engagement with the movable element of the adjusting device.

21. In a talking machine, the combination of an adjustable mechanism, an adjusting device, a Bowden wire having one end of its movable element engaging the adjustable mechanism and the other end engaging the movable element of the adjusting device, the said movable elements being freely separable, and two springs positioned respectively at the ends of the movable element of the wire and each tending to hold the movable element of the wire in engagement with the movable element of the adjusting device.

22. In a talking machine, the combination of a mechanism having a movable adjusting element, an adjusting device, a Bowden wire having one end of its movable element engaging the adjustable element of the mechanism and the other end engaging the adjusting device, the said movable elements being freely separable, and a spring tending to hold the movable element of the mechanism in engagement with the movable element of the wire.

23. In a talking machine, the combination of a mechanism having a movable adjusting element, an adjusting device, a Bowden wire having one end of its movable element engaging the adjustable element of the mechanism and the other end engaging the movable element of the adjusting device, each of the said movable elements being freely separable from the next, a spring tending to hold the movable element of the mechanism in engagement with the movable element of the wire, and a spring tending to hold the movable element of the wire in engagement with the movable element of the adjusting device.

24. In a talking machine, the combination of an adjustable mechanism, an adjusting device, and a Bowden wire having one end of its movable element engaging the adjustable mechanism and the other end engaging the adjusting device, the ends of both ele-

ments of the Bowden wire being freely detachable from the adjustable mechanism and the adjusting device respectively.

25. In a talking machine, the combination of an adjustable mechanism, an adjusting device, a Bowden wire having its outer element movable and in engagement at one end with the adjustable mechanism and the other end with the adjusting device, and means for anchoring the inner element of the wire against movement with the outer element.

26. In a talking machine, the combination of an adjustable mechanism, an adjusting device, a Bowden wire having its outer element movable, hollow plungers secured to the ends of the outer element and in engagement respectively with the adjustable mechanism and with the adjusting device, the said plungers being slotted, and pins extending through the slots in the plungers for anchoring the inner element of the wire against movement with the outer element.

27. In a talking machine, the combination of an adjustable mechanism, an adjusting device, a Bowden wire having its outer element movable, hollow plungers secured to the ends of the outer element and in engagement respectively with the adjustable mechanism and with the adjusting device, tubes surrounding the plungers, means for securing the tubes against movement, and means for connecting the ends of the inner element of the wire to the said tubes respectively.

28. In a talking machine, the combination of an adjustable mechanism, an adjusting device, a Bowden wire having its outer element movable, hollow plungers secured to the ends of the outer element and in engagement respectively with the adjustable mechanism and with the adjusting device, flanged tubes surrounding the plungers, sleeves surrounding the tubes and engaging the flanges to hold the tubes in place, and means for connecting the ends of the inner element of the wire to the said tubes respectively.

29. In a talking machine, the combination of an adjustable mechanism, an adjusting device, a Bowden wire having its outer element movable, hollow plungers secured to the ends of the outer element and in engagement respectively with the adjustable mechanism and with the adjusting device, tubes surrounding the plungers and flanged at the ends remote from the ends of the plunger, sleeves surrounding the tubes and threaded at the ends adjacent the flanges, caps in threaded engagement with the threaded ends of the sleeves and engaging the flanges to hold the tubes in place, and means for connecting the ends of the inner element of the wire to the said tubes respectively.

30. In a talking machine, the combination

of an adjustable mechanism, an adjusting
device, a Bowden wire having its outer ele-
ment movable, hollow plungers secured to
the ends of the outer element and in engage-
5 ment respectively with the adjustable mecha-
nism and with the adjusting device, blocks
within the plungers secured respectively to
the ends of the inner element of the wire,
means for holding the blocks against move-
10 ment, and coil springs within the tubes and

each engaging at one end with a block and
at the other end reacting against the outer
element of the wire.

In testimony whereof I have signed this
specification in the presence of two subscrib- 15
ing witnesses.

CLINTON E. WOODS.

Witnesses:

JOHN R. PETRIE,
JOHN S. GRIFFITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

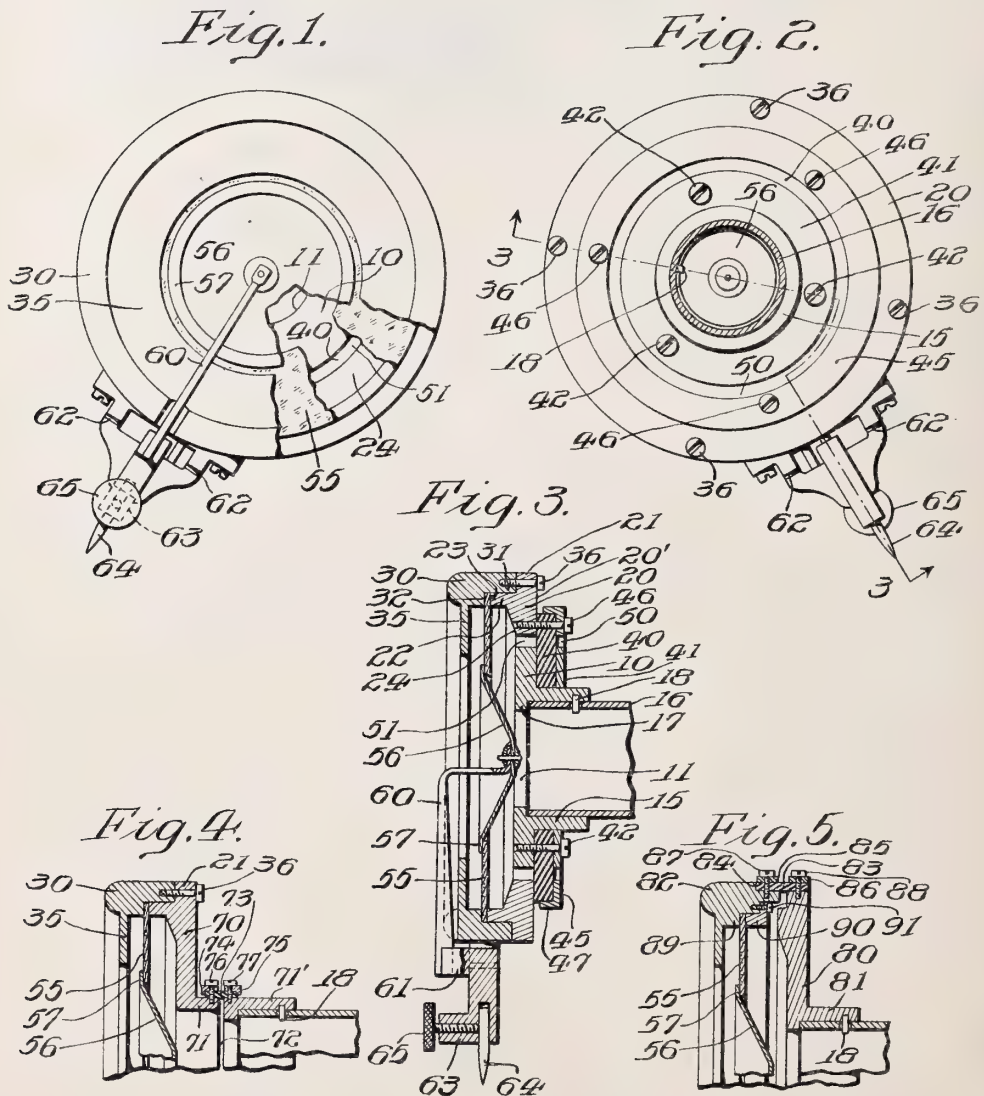
SOUND BOX,

#1,192,289-----J. C. English,
Patented-July 25th, 1916.
Filed-January 23rd, 1912.

J. C. ENGLISH
SOUND BOX,
APPLICATION FILED JAN. 23, 1912.

1,192,289.

Patented July 25, 1916.



INVENTOR

John C. English.

BY

James T. [Signature]

ATTORNEY

WITNESSES

F. J. Hartman.

A. L. Gardner.

UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX.

1,192,289.

Specification of Letters Patent.

Patented July 25, 1916.

Application filed January 23, 1912. Serial No. 672,961.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification.

The main objects of this invention are to provide in a sound box for talking machines, adjustable means for supporting the major portion of the same; to provide in a sound box, an improved diaphragm and mounting therefor; and to provide other improvements as will appear hereinafter, the purpose as a whole being to provide a sound box that will be extremely efficient in operation.

In the accompanying drawings, Figure 1 is a fragmentary front elevation of a sound box constructed in accordance with this invention; Fig. 2 a rear elevation of the same; Fig. 3 a longitudinal section on line 3—3 of Fig. 2; and Figs. 4 and 5 are fragmentary longitudinal sections of two modified forms respectively of the same.

Referring to the drawings, one embodiment of this invention consists of a sound box comprising a casing, including a flat annular supporting plate or member 10, coaxial with the casing and forming a portion of the back thereof. This supporting plate 10 is preferably made of comparatively rigid material, such as brass or any other suitable metal. Surrounding the central opening 11 of this plate 10 and projecting rearwardly from the plate, and integral or rigid therewith, is a tubular extension 15, which is adapted to telescope over the open free end of the usual or any suitable hollow tone arm 16 or other support. The internal diameter of the tubular extension 15 is preferably somewhat greater than the diameter of the central opening 11 of the supporting plate 10, thus forming an internal annular shoulder 17 between the tubular extension 15 and the supporting plate 10, this shoulder being adapted to abut against the inner end of the hollow tone arm 16 to assist in holding the sound box in position upon the tone arm. The usual pin 18 projects inwardly from the tubular extension 15 rigid therewith, and is adapted to perform its usual function

of engaging in a bayonet slot in the tone arm 16. The diameter of the opening 11 in the supporting plate and the internal diameter of the tone arm 16, are preferably made equal so that the inner surface of the tone arm 16 will be flush with the cylindrical wall of the opening 11.

Surrounding the supporting plate 10 coaxial therewith and slightly spaced therefrom, is an annular marginal member 20, also forming a portion of the back of the casing of the sound box, and preferably made of the same material as the supporting plate 10, or of any suitable comparatively rigid material. The rear surface 20' of this marginal member 20, is preferably flat and normally flush with the rear surface of the supporting plate. This marginal member 20 is provided upon its outer margin with an outwardly projecting flat annular flange 21, integral and coaxial therewith, and arranged flush with the rear surface 20' of the marginal member. The marginal member 20 projects forwardly from its flat annular flange 21 in the form of a cylindrical flange 22 having a flat annular forwardly facing end wall 23. From the cylindrical flange 22, the marginal member 20 tapers inwardly in thickness measured in a direction perpendicular to the rear surface 20', and the inner face 24 of the member 20 is conical in form and coaxial with the tubular extension 15.

Telescoping snugly over the cylindrical flange 22 of the marginal member 20 is a hollow cylindrical cap 30, also preferably made of brass or other suitable comparatively rigid material. This cap 30 has a flat annular rear wall 31 normally abutting against the front face of the flange 21 of the marginal member 20, and is provided with an internal annular shoulder 32 normally spaced slightly in front of the end wall 23 of the flange 22 of the marginal member 20 and of equal dimensions. The front portion of the cap 30 is provided with an inwardly projecting flat thin annular flange 35, coaxial and integral or rigid therewith. The cap 30 is secured to the marginal member 20 by means of screws 36 extending through the flange 21 and threaded into the rear wall of the cap, or by any other suitable means.

For yieldingly supporting the marginal member 20 and cap 30 carried thereby, a flat yielding annulus 40 snugly surrounds the tubular extension 15 and is secured to the rear wall of the supporting plate 10 and also to the rear wall of the marginal member 20. This yielding annulus 40 is preferably made of felt, leather, paper, cork, rubber, or any other similar or suitable yielding material. It has been found that felt gives very good results in this connection. The annulus 40 is preferably clamped securely against the rear wall of the supporting plate 10 by means of a metal or other comparatively rigid annular washer 41, fitting snugly around the tubular extension 15, and clamped against the rear face of the annulus 40 by means of headed screws 42, extending loosely through the washer 41 and annulus 40 and threaded into the supporting plate 10. The annulus 40 is also preferably clamped securely against the rear wall of the marginal member 20 by means of a similar flat annular outer washer 45, surrounding and spaced from the inner washer 41 and clamped against the rear wall of the annulus 40 by means of headed screws 46 extending loosely through the washer and annulus and threaded into the marginal member 20. The screws 42 through the inner washer 41 are preferably arranged in staggered relation with respect to the screws 46 of the outer washer 45. This outer washer 45 is preferably provided with an inwardly projecting marginal cylindrical flange 47 which engages snugly over the outer marginal wall of the annulus 40, and the inner end wall of which is normally spaced slightly from the rear wall of the marginal member 20. This flange 47 serves to confine the annulus 40 within certain limits and also protects the margin of the annulus and improves the appearance of the sound box.

The annular space 50 between the inner and outer washers 41 and 45 is preferably opposite and substantially equal in area to the area of the space 51 between the supporting plate 10 and the marginal member 20, and these spaces are preferably only of sufficient width to permit of a desirable amount of yielding or flexing of the annulus 40 throughout the annular portion of the annulus included between these two annular spaces.

Any suitable diaphragm may be used in connection with the casing of this improved sound box, but in the present instance, an improved diaphragm, which has been made the basis of a separate application, is shown in this connection. This improved diaphragm comprises a thin flat outer annular portion 55, made of cork or a composition of cork, or made of other subereous or suitable yielding material, having little, if any tendency, to set up local vibrations. Surround-

ed by the flat annular portion 55 is a thin comparatively rigid cupped or conical portion 56, made of any suitable material, such as stiff paper, and arranged normally coaxial with the sound box casing, and having its convex side facing rearwardly. The marginal portion 57 of this conical portion 56 is preferably slightly flattened and overlaps the inner margin of the flat annular portion 55 and is secured thereto, preferably upon the front side thereof, by means of cement or glue, or in any other suitable manner.

The outer marginal portion of the diaphragm is clamped securely in position by and between the end wall 23 of the marginal member 20 and the internal shoulder 32 of the cap 30 of the sound box casing. The nature of the material forming the marginal portion of the diaphragm is such that when the diaphragm is thus clamped in position, it adheres to the walls between, and by which it is clamped and any possibility of leakage of the air around the outer margin of the diaphragm is thus avoided, and also any tendency of the diaphragm to rattle is avoided.

Connected to the central portion or apex of the conical portion 56 of the diaphragm is one end of a stylus bar 60, which projects outwardly from the conical portion in a direction substantially coaxial therewith to a point in front of the flange 35 of the cap 30, and then turns radially outwardly in a direction parallel to the flange 35 and spaced slightly in front thereof. The outer portion 61 of this stylus bar is offset rearwardly outside of the cap 30 and is mounted upon the cap 30 to oscillate in respect thereto by means of spaced yielding connections 62, these yielding connections being preferably arranged so that the axis of oscillation of the stylus bar is substantially in a plane with the flat annular portion 55 of the diaphragm. The stylus bar is provided with an enlarged outer end 63 adapted to hold the usual or any suitable stylus 64, which is held in place by the usual set screw 65.

From the foregoing description, it is evident that in the construction described, the sound box casing may be considered broadly as being composed of two independently movable rigid members, one of which, including the marginal member 20 and the cap 30, carries the diaphragm and cooperating stylus, and the other of which including the supporting plate 10 and its tubular extension 15, is adapted to be mounted upon the tone arm 16 or other suitable carrier, these two main portions of the sound box casing being connected by a yielding or hinge-like means which permits of the relative movement of the main portions of the casing, and also acting as a closure for the space between these portions. It is also evident

that the yielding annulus 40 may be placed under a greater or less initial tension by adjusting the screws 42 and 46 to vary the compression of the annulus and that this variation of the initial aperture or tension would correspondingly affect the yielding qualities of the annulus and the freedom of movement between the two main portions of the sound box casing, and give a corresponding modification in the volume and quality of reproduction. It is also evident that in the operation of this sound box, the central portion of the diaphragm will vibrate as a whole without flexing, and the surrounding portion will flex to permit of this vibration.

Instead of forming the back of the sound box casing as hereinbefore described, of two spaced annular members, one surrounding the other, the back of the sound box may be formed of a single piece as indicated at 70 in Fig. 4, and having a tubular extension 71, 71' divided and spaced apart as at 72, the two portions 71 and 71' of the tubular extension being yieldingly connected by a cylindrical ring 73 of yielding material, such as felt or rubber, etc., snugly surrounding the tubular extension and clamped to the two portions of the extension by means of comparatively rigid flanged rings 74 and 75 held in place by screws 76 and 77 extending through the rings and threaded into the two portions 71 and 71' respectively of the tubular extension.

A further modification of this invention consists in forming the back of the sound box casing and its tubular extension in one part, as indicated at 80 and 81 respectively, and having an annular cap 82 spaced slightly in front of the back 80 and yieldingly connected thereto by means of a yielding cylindrical ring 83 surrounding the back 80 and engaging in an annular recess 84 provided therefor in the outer surface of the cap 82, the yielding ring 83 being clamped in position against the cap 82 and the back 80 by means of the rings 85 and 86 surrounding the yielding ring and held in place by screws 87 and 88 respectively, extending through the rings and threaded into the cap and the back respectively. In this case, the diaphragm is clamped in place between a ring 89 and the flanged ring 90 carried by the cap 82, the latter ring being clamped in position by means of screws 91 extending through the ring and threaded into the cap.

This invention is not limited to any specific construction disclosed, as various changes might be made in applying this invention without departing from the spirit of the invention or the scope of the appended claims.

Having thus fully described my invention, I claim and desire to protect by Letters Patent of the United States:

1. A sound box casing comprising two spaced portions, yielding substantially non-resilient means connecting said portions and means arranged to limit the outward radial expansion of said first-named means. 70

2. A sound box comprising an annular supporting member provided with a tubular extension rigid therewith, an annular marginal member surrounding and spaced from said supporting member, and yielding means surrounding said tubular extension and connecting said supporting member and said annular marginal member. 75

3. A sound box comprising an annular supporting member provided with a tubular extension, an annular marginal member surrounding said supporting member, a diaphragm carried by said marginal member, and yielding means surrounding said tubular extension and connecting said supporting member and said marginal member. 85

4. A sound box comprising an annular supporting member, an annular marginal member surrounding said supporting member and spaced therefrom, yielding means connecting said members and forming a closure for the space between the same, and a diaphragm carried by said marginal member. 90

5. A sound box comprising an annular supporting member provided with a tubular extension rigid therewith, a second annular member surrounding said first-mentioned annular member, a diaphragm carried by said second annular member, and yielding means connecting said annular members. 100

6. A sound box comprising an annular supporting member provided with a tubular extension rigid therewith, an annular marginal member surrounding said supporting member and spaced therefrom, and a flat yielding annulus surrounding said tubular member and connecting said members. 105

7. A sound box comprising a casing including an annular supporting member provided with a tubular extension rigid therewith, an annular marginal member surrounding said supporting member and spaced therefrom, a substantially flat yielding annulus snugly surrounding said tubular extension and connecting said members, and annular means overlapping and engaging the outer margin of said annulus for holding the same in position. 115

8. A sound box comprising a casing including an annular supporting member having a tubular extension rigid therewith, an annular marginal member surrounding said supporting member and spaced therefrom, a yielding annulus surrounding said tubular extension outside of said members, a washer surrounding said tubular extension, means for clamping said washer against said annulus, an outer washer surrounding and spaced from said first mentioned washer, 120 125 130

and means connected to said annular marginal member for clamping said outer washer against said annulus.

9. A sound box comprising a casing including an annular supporting member having a tubular extension rigid therewith, an annular marginal member surrounding said supporting member and spaced therefrom, a yielding annulus surrounding said tubular extension outside of said members, a washer surrounding said tubular extension, means for clamping said washer against said annulus, an outer washer surrounding and spaced from said first mentioned washer, and means connected to said annular marginal member for clamping said outer washer against said annulus, said latter washer being provided with an inwardly projecting marginal flange overlapping and engaging the marginal edge of said annulus.

10. A sound box comprising an annular supporting member provided with a tubular extension rigid therewith, an annular marginal member surrounding and spaced from said supporting member, an annular cap carried by said marginal member, a diaphragm clamped between said cap and said marginal member, and yielding means connecting said supporting member and said marginal member.

11. A sound box comprising an annular supporting member provided with a tubular extension rigid therewith, an annular marginal member surrounding and spaced from said supporting member, an annular cap carried by said marginal member, a diaphragm clamped between said cap and said marginal member, and yielding means connecting said supporting member and said marginal member, said diaphragm comprising a flat, annular yielding portion, and a comparatively rigid central portion surrounded by and secured to said flat yielding portion.

12. A sound box comprising an annular supporting member provided with a tubular extension rigid therewith, an annular marginal member surrounding and spaced from said supporting member, an annular

cap carried by said marginal member, a diaphragm clamped between said cap and said marginal member, and yielding means connecting said supporting member and said marginal member, said diaphragm comprising a flat, annular yielding subereous portion, and a comparatively rigid central portion surrounded by and secured to said flat yielding portion.

13. A sound box casing comprising two separately movable portions, yielding means forming the sole connection between the said portions, and means arranged to compress said yielding means in one direction, said yielding means being held against expansion in a direction transverse to said first-mentioned direction.

14. A sound box casing comprising two spaced portions, yielding means holding said portions in spaced relationship, means to subject said yielding means to different degrees of compression, and means to limit the outward expansion of said yielding means.

15. A sound box casing comprising spaced portions, yielding annular means holding said portions in spaced relationship, means to subject said annular means to different degrees of compression and annular relatively rigid means inclosing said yielding means to limit the outward expansion of said yielding means.

16. A sound box casing comprising two spaced portions, yielding annular means forming a closure for the entire space between said portions, means clamping said yielding means to one of said portions, and means clamping said yielding means to the other of said portions, said portions being in contact with said yielding means upon one side only of said yielding means.

In witness whereof, I have hereunto set my hand this 19th day of January A. D., 1912.

JOHN C. ENGLISH.

Witnesses:

EDWARD K. MACEWAN,
JOHN D. MYERS.

SOUND BOX FOR PHONOGRAPHS,
#1,192,337-----H. A. Myers,
Patented-July 25th, 1916.
Filed-April 12th, 1916.

H. A. MYERS.
SOUND BOX FOR PHONOGRAPHS.
APPLICATION FILED APR. 12, 1916.

1,192,337.

Patented July 25, 1916.

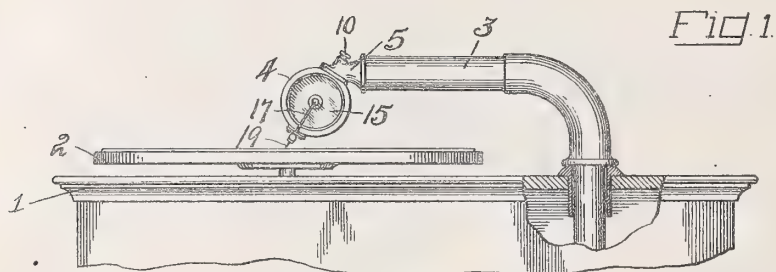


Fig. 1.

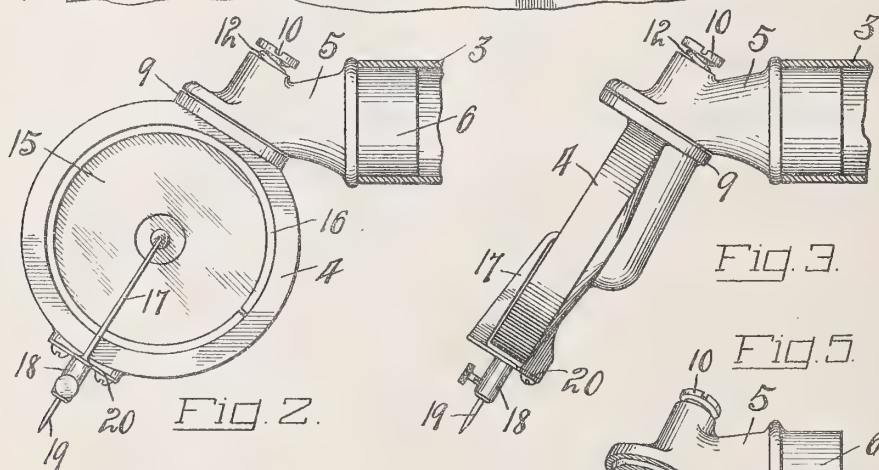


Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

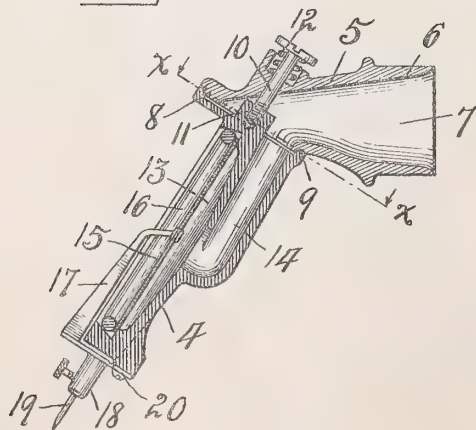


Fig. 6.

INVENTOR

Hubert A. Myers.
By *Wm. Owen & Crampton.*
His attys.

UNITED STATES PATENT OFFICE.

HUBERT A. MYERS, OF TOLEDO, OHIO.

SOUND-BOX FOR PHONOGRAPHS.

1,192,337.

Specification of Letters Patent.

Patented July 25, 1916.

Application filed April 12, 1916. Serial No. 90,687.

To all whom it may concern:

Be it known that I, HUBERT A. MYERS, a citizen of the United States, and a resident of Toledo, in the county of Lucas and State of Ohio, have invented a certain new and useful Sound-Box for Phonographs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to sound reproducing instruments of the phonograph type, and particularly to improvements in the sound box of such instruments. In some instruments of this character the vibrations produced on the stylus by the record are of a lateral character, as in the case of records used on Victor and Edison machines, while in the case of records used on some other machines the vibrations produced on the stylus are of a vertical character. In other words, the records used on some makes of phonographs or similar machines have the sound wave undulations formed depth-wise of the groove therein in which the reproducing stylus travels, while with records used on other makes of machines the sound wave undulations are formed crosswise of the groove.

The object of my invention is the provision of a sound box of the character described which is simple and efficient in its construction and capable of universal use in connection with different types of machines of the class described, and of being easily and quickly adjusted to suit the character of the groove in the record which it is desired to use.

The invention is fully described in the following specification, and while, in its broader aspect, it is capable of embodiment in numerous forms, a preferred embodiment thereof is illustrated in the accompanying drawings in which—

Figure 1 is a side elevation of a portion of the phonograph embodying my invention. Figs. 2 and 3 are enlarged side elevations of the sound box embodying the invention in operative position for records having grooves of different styles. Fig. 4 is a central vertical section of Fig. 3. Fig. 5 is a perspective view of the sound-box

carrying head, and Fig. 6 is a section on the line $x-x$ in Fig. 4.

Referring to the drawings, 1 designates the cabinet of a phonograph, 2 the rotatable record supporting table carried thereby, and 3 the sound-box carrying arm, which extends through and is pivoted to the top of the cabinet at one side of the table 2 for horizontal swinging movements with respect thereto. The arm 3 is hollow in form and forms a portion of the conduit through which the reproduced sound waves pass, as is well understood in the art.

The sound-box embodying my invention is designated 4 and is carried for rotary movements by a head 5 adapted to be placed into removable engagement with the free end of the arm 3. The head 5, in the present instance, forms a nipple 6 at one end thereof for removably fitting into the free end of the arm 3 and is provided throughout its length with a passage 7, which opens communication between the interior of the sound-box and the arm 3. The outer end of the head 5 is formed on an incline to the head axis and is provided at such end around the passage 7 with an annular shoulder 8 with which an annular flange 9 on the inner end of the sound-box 4 coacts to guide the rotary adjusting movements of the sound-box with respect to said head.

The sound-box 4 is rotatably held to the head 5 by a screw 10, which projects through the top portion of the head in coaxial relation to the turning axis of the box 4 and is threaded into or otherwise suitably secured to the inner end of said box, as indicated at 11. The screw 10 is intended to turn freely in the head 5 and is encircled at its outer end by a coiled compression spring 12, which has its opposed ends thrust against the outer side of the head and the headed end of the screw 10, thereby coacting with the screw 10 to yieldingly retain the sound-box 4 closely seated against the head 5.

The sound-box 4 is provided in one side thereof with a recess or cup-like chamber 13, which has communication at its bottom through a passage 14 with the adjacent end of the passage 7 in the box carrying head 5. A diaphragm 15 is mounted in the chamber 13 in spaced relation to the bottom thereof whereby it is permitted to have free vibratory movements, and is retained in the chamber, in the present instance, by a split retaining ring 16. A stylus carrying arm

17 is attached at one end to the center of the diaphragm 15 thence extends transversely of the sound-box to and around the lower edge thereof and is provided at such edge of the box with a stylus carrying part 18, the axis of the stylus receiving socket of which is coincident with the turning axis of the sound-box with respect to the head 5.

19 designates a stylus that is carried by the vibrator arm 17. The stylus carrying end of the arm 17 is secured to the adjacent end of the sound-box 4, as at 20, but is permitted to have free flexing or vibratory movements with respect thereto.

It will be understood that any vibration of the stylus 19 in order to be communicated through the arm 17 to the diaphragm 15 must be in a plane which is longitudinal and not transverse to the diaphragm axis. Therefore, if the sound reproducing undulations of the record used are of the lateral character, the sound-box must be turned so that the axis of the diaphragm is disposed in transverse relation to the record groove in which the stylus travels, as indicated in Figs. 1 and 2, thus permitting the transverse vibrations of the stylus to be communicated to the diaphragm through the arm 16. On the other hand, if the undulations in the record groove are of the depth-wise character, the sound-box must be given a quarter turn with respect to the head 5 from the position which it has when used in connection with a record groove having undulations of the lateral type, so that its position with respect to the head will be as indicated in Figs. 3 and 4. Inasmuch as the stylus 19 and turning axis of the diaphragm box are inclined in a direction opposed to the direction of movement of the record groove, it is apparent that when the sound-box is disposed in the position shown in Figs. 3 and 4, with the diaphragm axis disposed lengthwise of the groove in which the stylus travels, the vertical vibratory movements which are communicated to the stylus 19 transversely thereof will be transmitted to the diaphragm through the arm 17.

The adjacent ends of the sound-box 4 and head 5 are provided with parts 21 and 22, respectively, which coact to limit the rotary adjusting movements of the sound-box with respect to the head.

I wish it understood that my invention is not limited to any specific construction, arrangement or form of the parts, as it is

capable of numerous modifications without departing from the spirit of the claims.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an instrument of the class described, a swinging arm having a passage longitudinally therethrough and having its free end terminating at its lower side in a circular face through which said passage opens, a sound-box having a circular upper end part in rotatable engagement with said face and having a sound transmitting passage extending transversely thereof and opening into the face end of said arm passage, means pivotally securing said sound-box to said arm, and a stylus carried by said sound-box at the edge thereof opposed to its pivoted end, said stylus having its axis coincident to the pivotal axis of said sound-box.

2. In an instrument of the class described, a hollow arm mounted for swinging movements and having its outer end terminating in a head, which head is provided on its under side with an inclined circularly flanged face through which the outer end of the arm passageway opens, a sound-box having a circular part at its upper end in rotatable engagement with said head face and having a sound transmitting passage extending transversely thereof and in communication with the passage through said head, means for yieldingly securing said sound-box in pivotal engagement with said face, and a stylus carried by said sound-box at the edge thereof opposed to said face, and with its axis coincident with the turning axis of said sound-box.

3. In an instrument of the class described, a hollow swinging arm having a head at its outer end through which the arm passage extends, a sound-box having its upper end in rotatable engagement with said head, with its sound communicating passage in communication with the head passage, a pivot-screw projecting through a portion of the head and into the adjacent end of said sound-box to connect the two, means yieldingly coacting with said screw and head to retain the sound-box and head in yielding rotatable engagement, and a stylus carried by the sound-box at its outer end, and with its axis coincident with the axis of said pivot-screw.

In testimony whereof I have hereunto signed my name to this specification.

HUBERT A. MYERS.

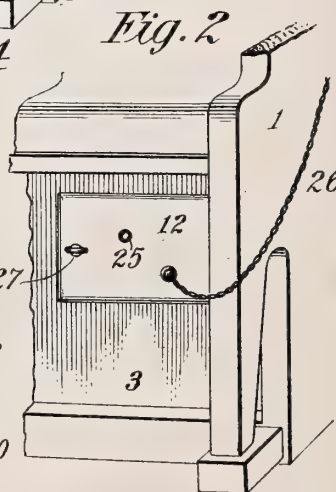
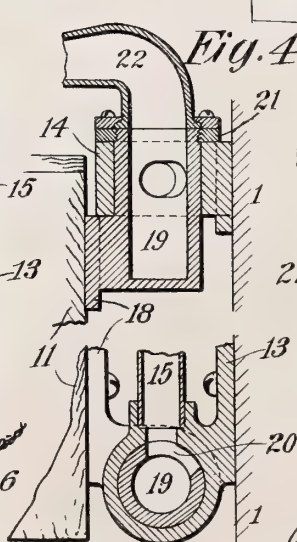
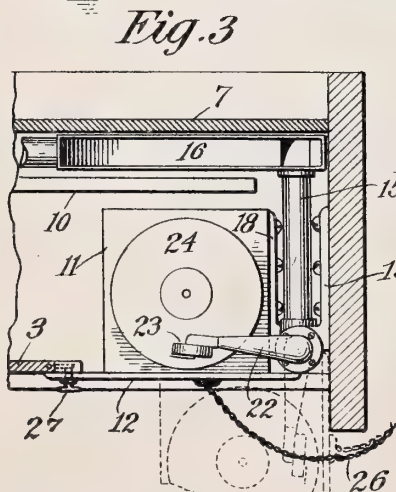
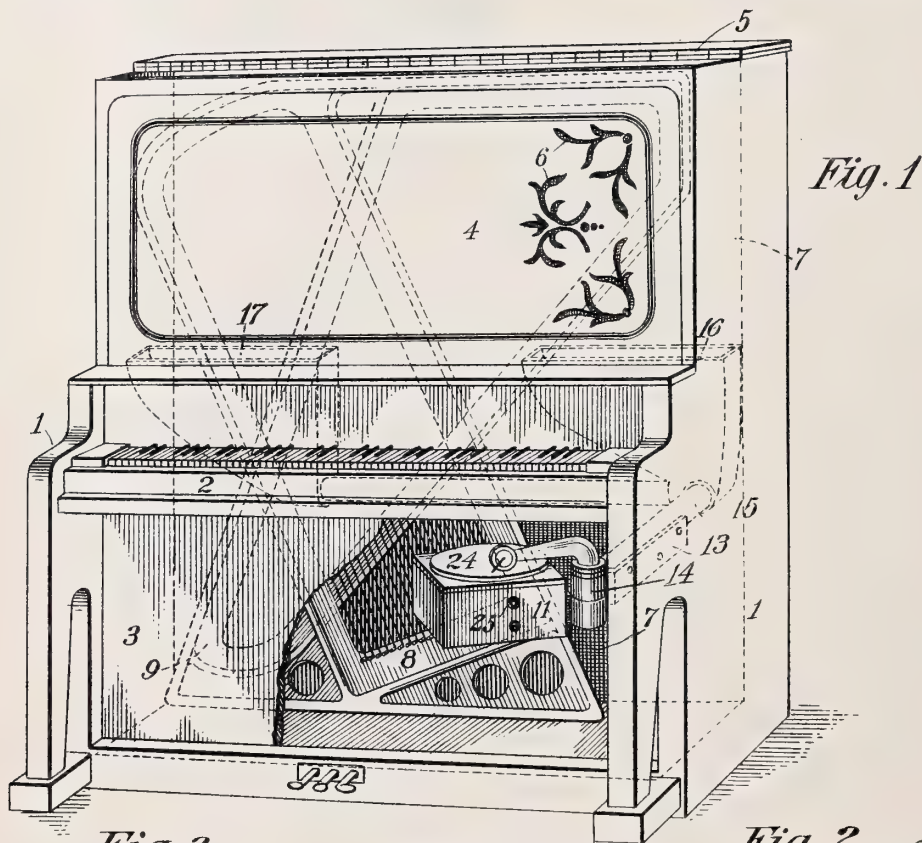
MUSICAL INSTRUMENT ,

#1,192,402-----V. H. Emerson,
Patented-July 25th, 1916,
Filed-September 20th, 1912.

V. H. EMERSON.
MUSICAL INSTRUMENT.
APPLICATION FILED SEPT. 20, 1912.

1,192,402.

Patented July 25, 1916.



Witnesses:
Raphael Netter
Ruth C. Fitzhugh

Fig. 5

Victor H. Emerson,
Inventor
By his Attorneys
Mauro Cameron, Lewis & Massie

UNITED STATES PATENT OFFICE.

VICTOR H. EMERSON, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

MUSICAL INSTRUMENT.

1,192,402.

Specification of Letters Patent.

Patented July 25, 1916.

Application filed September 20, 1912. Serial No. 721,432.

To all whom it may concern:

Be it known that I, VICTOR H. EMERSON, a citizen of the United States, and a resident of the city, county, and State of New York, (whose post-office address is 102 West Thirty-eighth street, New York city, New York,) have invented a new and useful Improvement in Musical Instruments, which invention is fully set forth in the following specification.

This invention relates to talking-machines of the type intended primarily for giving audible reproductions from "sound-records".

One object of the invention is to provide an apparatus of this kind which shall give improved acoustical results, characterized by richness and fullness of tones, and with elimination of most of the disagreeable noises frequently attending such reproductions, but without sacrifice of clearness of definition.

Another object of the invention is to provide the mechanism of the talking-machine with a suitable cabinet or casing, of attractive appearance, which dispenses with the ordinary protruding horn or sound-conveyer, and protects the mechanism from injury.

The invention comprises the providing a suitable inclosed sound-chamber, located in the passage between the diaphragm and the exit, and so constructed and arranged that it will be responsive to and will reinforce the entire range of tones, as distinguished from a "resonance-chamber" (technically speaking) that responds to only one note of definite pitch (or to only a few notes), while remaining inert as to other tones.

The invention comprises the manner of mounting the mechanical parts of the talking-machine proper, in connection with the sound-chamber, within a suitable casing. And, finally, the invention further comprises the various features of construction and arrangement hereinafter set forth and claimed.

The invention will be best understood in connection with the annexed drawings, which represent one preferred embodiment thereof, showing, among other things, a so-called disk graphophone mounted within an ordinary upright piano. But the invention is not limited to this particular form of talking-machine, nor is it limited to the use of a piano of the upright (or of any other) form. However, for the sake of clearness; the in-

vention will be shown and described in connection with a disk graphophone and an upright piano.

In the drawings, Figure 1 is a perspective of an upright piano, equipped with a disk graphophone swung part way out, part of the piano-casing being broken away; Fig. 2 is a similar view of one end of Fig. 1, indicating the graphophone as inclosed in the inner position; Fig. 3 is a horizontal section through the piano-casing, taken above the level of the talking-machine; and Figs. 4 and 5 are vertical and horizontal sections respectively, through the joint or mounting, shown on a larger scale.

Referring to these drawings, 1 represents an end-wall or side of the cabinet or casing of an ordinary upright piano, having the overhanging key-board shelf 2, the lower front panel 3, the upper front panel 4, and the usual hinged top 5. The front panel 4 is preferably apertured, as with scroll-work (only a portion of which is indicated), and provided with a screen 6, of fabric; and is preferably hinged so that it can be opened more or less.

7 represents the back of the piano, which acts as a sounding-board; and 8—9 represent the piano-strings and frame, while 10 indicates conventionally the location of the levers, hammers, etc., constituting the action or works. The comparatively-shallow but widely-extended space between the sounding-board at the rear and the panels at the front constitutes the sound-chamber for the talking-machine.

The graphophone (or talking-machine proper) 11 is shown in this particular embodiment as located within one end of the inclosed space beneath the shelf 2. More specifically, a sufficient portion of the lower panel 3 is cut away to permit the graphophone to be moved in and out, and the cut-away space is covered by a piece 12 permanently affixed to the front of the graphophone-frame as an apron, so that when the graphophone is inserted into place this apron lies more or less flush with the rest of the panel 3, to completely inclose the interior.

13 represents a bracket firmly secured to the inner face of the end wall of the piano, and having the bearing-ring 14 extending horizontally therefrom. From this ring extends the stationary sound-passage 15, shown

as dividing into two branches 16 and 17 respectively, which open upwardly into the sound-chamber in front of the sounding-board 7 (closely adjacent to, but not in actual contact therewith), discharging their sound-waves along the surface of the sounding-board (rather than against it).

18 is another bracket secured to the frame of the talking-machine and carrying the hollow cup 19 that journals within the ring 14,—this cup being cut away at 20 to afford passage into the sound-conveyer 15. The upper end of this cup protrudes above the ring 14, and is exteriorly screw-threaded, to receive the clamping-ring or nut 21, which latter serves to lock together the two members 13—14 and 18—19 which constitute the hinge-mounting for the talking-machine as well as the air-tight joint for the sound-conveyer. Upon the top of the protruding upper end of the cup 19 is swiveled the hollow sound-conveyer or tone-arm 22, whose outer end carries the usual sound-box 23 having a diaphragm and stylus.

To the plate 18 is secured the frame of the graphophone, as stated; and above the bed-plate of this frame is located the usual horizontal turntable 24, in position to carry a disk sound-record in operative relation to the stylus on the swinging tone-arm 22. The motor (not shown) is suitably secured beneath the bed-plate of the frame, and may be a spring motor, in which case it may be wound by a key or crank as at 25; or it may be an electric motor, in which case it would be actuated through an electric-cable as 26, connected with a suitable electric plug.

A suitable handle 27 on the apron 12 enables the user to swing the graphophone out, for substituting fresh needles and for removing and replacing the disk-records. When ready to play, the machine is swung back into place, and the apparatus started, as by turning on current or pushing the starting-lever. The sound-waves are conveyed from the diaphragm, through the swinging tone-arm and the stationary sound-passage (or passages), into the sound-chamber; there the sounding-board responds to all the tones, and moreover the proper piano strings become selectively resonant to their respective notes. Furthermore, the presence of the piano-action or works (and of the strings) seems to blend the sound-waves in a most pleasing manner, while smothering the harsh mechanical noises (if any); while the fact that the piano-works are interposed between the sounding-board and the air-space surrounding the sound-box and needle, practically shields the sounding-board from all sounds except the music. If desired, the mechanism below the bed-plate (motor and gears) may be inclosed in a compartment of its own as 11; and the space occupied by the tone-arm and disk-record may be shut

out from the resonance-chamber, as by a partition.

In the particular embodiment shown, the sound-chamber (into which the sound-waves are led) has as one wall a sounding-board of comparatively large area, while the sound-chamber itself is comparatively shallow. Preferably, the sound-waves are introduced in a direction parallel with the sounding-board, whereby the vibrations are diffused or blended together, and emerge through the screened apertures in the upper panel 4, or through the opening provided by raising the lid 5, to give a most pleasing effect. And, preferably also, the properly-attuned pluralities of piano-strings are parallel to the sounding-board. If desired, part or all of the piano-action or works might be removed or omitted from the sound-chamber, and so might some or all of the piano-strings also; and these parts might be arranged otherwise than as shown. But so far as we have observed, the presence of the works is not only unobjectionable but quite beneficial, while the presence of the strings is a distinct advantage.

An attendant advantage of the invention is that it dispenses with a separate cabinet for the talking-machine, permitting the householder to install in his apartments, which may be of modest size, a talking-machine as well as a piano, without having to find room for two different articles of furniture. The piano serves as a handsome cabinet or casing to support and conceal the talking-machine (and also a "piano-player," if desired); it affords the best kind of sound-chamber therefor; and its piano-strings (and works) co-act to enhance the acoustical results.

The invention has thus been described with some particularity of detail, but only for the sake of clearness, since it is not limited to the precise construction and arrangement of parts set forth, but may be embodied in various forms and modifications.

Having thus described my invention, I claim:

1. A musical instrument, comprising a cabinet inclosing a sound-chamber, a sounding-board constituting one wall of said chamber, a plurality of tuned strings extending across said chamber parallel to said sounding-board, and a talking-machine movably mounted within said cabinet and having a sound-passage discharging into said sound-chamber adjacent said sound-board and in a direction parallel to the surface thereof.

2. A musical instrument, comprising the combination of a cabinet containing a sound-chamber one outer vertical wall of which is a sound-board and the opposite wall of which is cut away to permit insertion of a talking-machine, a talking-machine located

therein, two hollow hinge-members journal-
ing together and secured respectively to the
inner face of said cabinet and to the talking-
machine, a swinging sound-conveyer carry-
5 ing a diaphragm and stylus in operative en-
gagement with a sound-record upon said
talking-machine and communicating through
said hollow hinge with the interior of said
sound-chamber, and an apron carried by said

talking-machine to close said cut-away 10
opening.

In testimony whereof I have signed this
specification in the presence of two subscrib-
ing witnesses.

VICTOR H. EMERSON.

Witnesses:

MAY H. McCOSKER,

HENRY WATERSON, Jr.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

METHOD OF MANUFACTURING
SOUND RECORD TABLETS,

#1,192,567-----J. Sanders,,
Patented-July 25th, 1916.
Filed-January 11th, 1908.

J. SANDERS.
METHOD OF MANUFACTURING SOUND RECORD TABLETS.
APPLICATION FILED JAN. 11, 1908.

1,192,567.

Patented July 25, 1916.

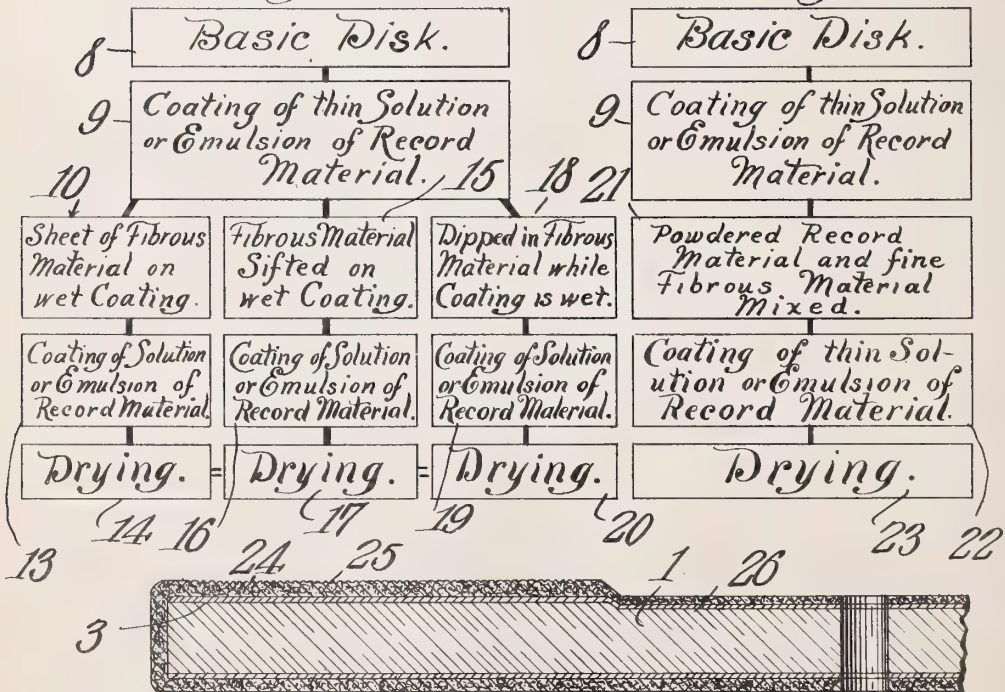
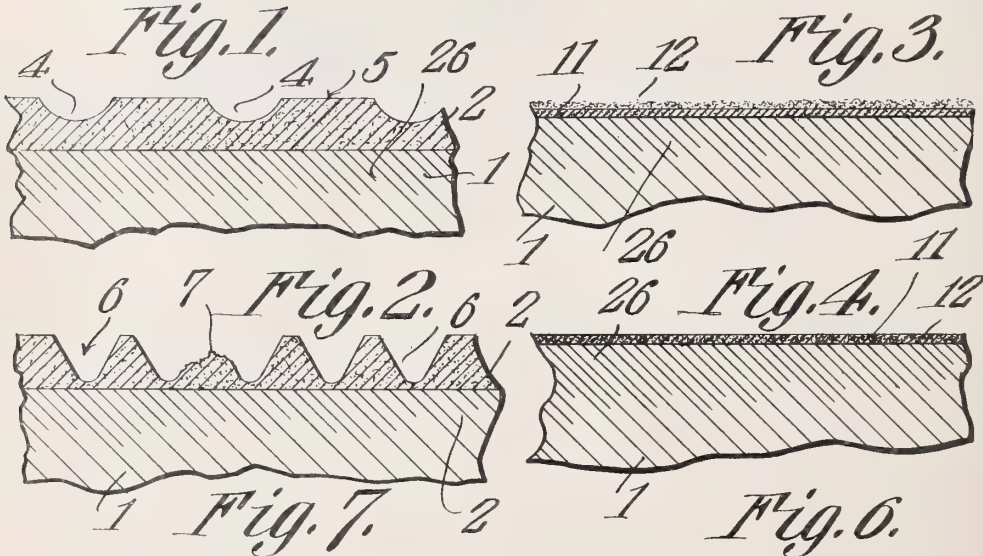


Fig. 5.

Joseph Sanders.

Witnesses
E. H. Leonard
H. J. Chapman

By C. A. Snow & Co.
Attorneys

UNITED STATES PATENT OFFICE.

JOSEPH SANDERS, OF WASHINGTON, DISTRICT OF COLUMBIA.

METHOD OF MANUFACTURING SOUND-RECORD TABLETS.

1,192,567.

Specification of Letters Patent.

Patented July 25, 1916.

Application filed January 11, 1908. Serial No. 410,456.

To all whom it may concern:

Be it known that I, JOSEPH SANDERS, a citizen of the United States, residing at Washington, District of Columbia, have invented
5 a new and useful Method of Manufacturing Sound-Record Tablets, of which the following is a specification.

This invention has reference to improvements in the method of manufacturing
10 sound record tablets, the term tablets being used in this connection to include either a tablet before the sound record groove is impressed therein or the finished tablet with the groove impressed therein.

15 The sound record tablet hereinafter described is not herein claimed since it forms the subject matter of and is claimed in another application filed by me on April 29, 1908, under Serial No. 429,931, for sound
20 record tablets, as a division of this application.

At the present time the principal type of sound record tablets is the disk shaped tablets, and these are commonly made of a mixture of shellac and other materials, including fibrous material, usually cotton fiber cut into short lengths and known as cotton flock. The usual practice of making sound record
25 tablets is to take a mixture of such materials with the ingredients already incorporated, and soften the same by heat and then impress a sound record groove from a matrix of the same into the heated and thereby softened material, the heat and pressure being
30 sufficient to produce a faithful copy of the matrix into the heated material which is pressed out into the form of a disk of appropriate size and is allowed to cool and set under pressure. Such sound record tablets
40 with the sound groove impressed therein have become known, commonly, as sound records and are also known by various trade names, but for reasons which need not be here stated, I prefer to designate the type
45 of record tablets described as a gramophone sound record, and the material as gramophone record material. Among other gramophone record materials that described in Letters Patent No. 787,001, granted to me
50 on April 11, 1905, under the title of "Composition of matter for sound record tablets," is particularly adapted for use in the present invention. Furthermore the type of tablet described in Letters Patent No.
55 956,904, for sound record tablets, granted to me on May 3, 1910, is a type of tablet to

which the present invention is particularly applicable. However the surfacing material applied in the manner described in said Letters Patent last named is not perfectly
60 adapted to all conditions.

The ordinary gramophone sound record groove is about 1/250 of an inch, more or less, in width, and of commensurate depth, being sometimes as shallow as 1/500 of an
65 inch and at other times deeper in accordance with the desires of the recording expert. Some experts use very deep and wide grooves compared with those used by others. The standard pitch of the spiral on which
70 the groove is produced is approximately one hundred turns to the inch. The result is that while a comparatively narrow, shallow groove has at all times comparatively wide plateaus between the turns even when the
75 turns are closest due to the sinuosities of the groove representing sound waves, a deep and wide groove will at times produce narrow plateaus between closely approaching
80 turns and oftentimes the walls of a groove are quite thin for a considerable distance into the face of the tablet.

A shellac containing gramophone record material where the shellac is associated with
85 oxid of iron or some other like material is quite brittle when flock is omitted for reasons which will hereinafter appear and the thin walls between two turns of deep grooves are unable to resist the lateral thrust or
90 strain due to the guiding of the stylus and the parts controlled thereby and these walls often break down under such thrust or strain, the walls where merging into the plateaus being shattered or chipped away and the record becomes defective for reproduction
95 to a commensurate extent.

It is one of the objects of the present invention to overcome this defect without sacrificing any of the advantages inherent in a record disk comprising a basic structure of
100 material other than that used for the record receiving surface and this object is realized by incorporating in the surfacing of record material a suitable quantity of fibrous material which will serve to very markedly
105 chipping or shattering or breaking down of the walls of the groove in the manner and under the conditions stated.

In the aforesaid Patent No. 956904, the surfacing material is applied in liquid form,
110 that is the shellac is dissolved and the other materials are held in suspension in the solu-

tion, but the presence of fibrous material renders it difficult to produce an even coating, even though the fibrous material be cut very fine, the fiber absorbing much of the solvent. It is therefore not an uncommon practice in making up tablets in the manner set forth in the said Letters Patent to omit the flock from the surface layer. Furthermore when the surface layer is deposited from an emulsion and this layer is made fairly heavy the quick exterior drying of the material retards the drying out of the remainder for a comparatively long time, or several thin coats must be applied to get the requisite thickness of the surfacing.

The production of a surface coating of the desired record material of the requisite thickness but which shall be quick drying and which can be applied without additional handling constitutes another part of the present invention and consists in applying to the matrix structure a cementing material to which the final coating in powdered form is applied, the solvent of the material, when such solvent is employed quickly evaporating because of the large exposed surface.

The usual method of manufacturing the record material by softening the shellac and then mixing therewith the other ingredients does not cause the infiltration of the fibers of the fibrous material by the shellac. Therefore the material is more or less hygroscopic and many such records become defective in damp climates, particularly in warm moist climates.

To obviate this defect constitutes a still further object of the present invention and this is done by applying an additional coating of a thin solution or emulsion of the record material from which flock has been omitted. By this means the fibrous material of the record surface has its fibers encapsuled in the non-fibrous record material and they are thereby either so infiltrated with the record material or so protected thereby as to be unaffected by moisture even when subjected to the effects of moist torrid climates such as are sometimes encountered in the tropics.

The invention will be best understood from a consideration of the following detail description taken in connection with the accompanying drawings forming a part of this specification, in which drawings,—

Figure 1 is a partially schematic section of a small portion of a sound record of the gramophone or disk type, showing the comparatively shallow form of record groove. Fig. 2 is a similar view showing the deeper and wider form of record groove. Fig. 3 is a schematic sectional view of a tablet made in accordance with the present invention and illustrating one phase of the process of manufacture. Fig. 4 is a similar view to Fig. 3 to illustrate a more advanced step

in the manufacture. Fig. 5 is a schematic sectional view of a portion of a record tablet made in accordance with the present invention and indicating a sound record impressed therein. Fig. 6 is a diagram indicating consecutive steps in the manufacture of a sound record in accordance with the present invention, and Fig. 7 is a like diagram showing some variations of the steps in the manufacture from that shown in Fig. 6.

Referring to Figs. 1 and 2, there is shown a base 1 and a surfacing 2. The proportions of these two parts are of course greatly exaggerated since the entire tablet need not exceed about one-eighth of an inch in thickness and the surfacing material may be one one-hundredth of an inch or less in thickness, and under some circumstances may be considerably less than one one-hundredth of an inch in thickness. The basic material is preferably, though not necessarily, made of cardboard or pasteboard or other cheap fibrous material which, for reasons which need not be entered into here, but which are fully disclosed in my aforesaid application, is sized with rosin or other like material, but preferably a material which will soften under heat and which is hard and firm when cold. Nor is it necessary for the purposes of the present invention that the base or understructure be made of a single disk, as for instance, a disk of cardboard made of macerated fibrous material, but may be made up of a number of sheets of fibrous material as is present in laminated cardboard, or the base may be made of a disk of cardboard preferably suitably sized upon which is secured a thin disk of paper carrying the record material. This last-named structure and its purposes and advantages are set forth in my application #239,961, filed January 6, 1905, for gramophone record tablets. It need only be stated here that the interposed sheet of paper between the record-receiving material and the base facilitates the manufacture and also aids in preventing any admixture of materials used in the base with the record-receiving material where the materials contained in the base or some of them are detrimental to the said record-receiving material. This extra sheet of paper is indicated by the reference numeral 3 in Fig. 5.

In Fig. 1 there are shown two adjacent grooves 4, 4, and these may be taken as indicative of the more shallow type of gramophone or disk record grooves where the normal separation of the turns of the spiral constituting the record groove is approximately one one-hundredth of an inch, while the width of the grooves themselves is considerably less, say, approximately one two-hundred and fiftieth of an inch, and the depth, say, one five-hundredth of an inch more or less. These figures are of course to be taken only as approximate. In such com-

paratively narrow and shallow grooves the intervening plateau 5 is of considerable width and the thickness of material between adjacent spirals of the groove is well able to withstand the side thrust of a reproducing stylus when being actuated by the record groove and constrained to follow the sinu-
 5 osities representing sound waves, even when the sinuosities of one member of the spiral groove are in the opposite sense to the sinu-
 10 osities of the next adjacent member of the spiral groove, as will sometimes happen, for even then the plateau is of considerable width and the walls of the groove approach
 15 the same at such an obtuse angle that the intervening record material between two even closely approaching adjacent members of the groove is still of such thickness as to well withstand the thrust of the stylus.
 20 However, it is the custom of some recording experts to form the record grooves much deeper and wider than those indicated in Fig. 1, and such deep wide record grooves are indicated at 6, 6, in Fig. 2. With such
 25 grooves the plateaus are normally narrower than the normal plateau of the tablet of Fig. 1, and when the sinuosities of the adjacent spiral members are in opposite sense, as they often are, so that a particular portion of the
 30 groove in one spiral member is brought into very close relation to a particular portion of the groove of the other spiral member, then the intervening plateau is reduced to very narrow limits and the steepness of the
 35 walls of the groove leave much less record material between the two adjacent positions of the spiral members of the groove than under the conditions of Fig. 1. The result is that a brittle record material without the
 40 presence of flock or other strengthening fiber, is unable to withstand the thrust of the reproducing stylus and pieces of the intervening record material between the walls of the adjacent portions of the grooves are
 45 shattered and broken away, as roughly indicated at 7 in Fig. 2, thus marring the reproducing qualities of the record tablet and sometimes destroying its usefulness for further reproduction.

50 Gramophone or disk record materials made of shellac and other ingredients are too brittle to be rolled out into very thin sheets for application to the fibrous or other base, and consequently can only be economi-
 55 cally applied to such base either in the manner hereinafter described or when the shellac is dissolved in a suitable solvent, and the other materials are held in suspension in the shellac solution so as to form what may
 60 be termed an emulsion of the gramophone or disk record material. Such emulsion is readily applied by a brush or by dipping the basic disk or paper vehicle therein. However, the presence of flock renders it
 65 very difficult to produce from an emulsion

an even layer with the materials properly distributed and a surface coating so formed is comparatively slow drying because, among other reasons, the flock absorbs a material
 70 portion of the solvent, as before stated. So where the shallow grooves are used the surface layer of record material is made of shellac and oxid of iron or some similar material without the admixture of flock.

The flock, which term may be taken as
 75 descriptive of any suitable fibrous material in a suitably finely cut state is added to the surface material composed of shellac and other ingredients, while it is in the form of a thin solution or emulsion which is coated
 80 upon the basic disk or upon the paper vehicle by means of a brush or by dipping or in any other suitable manner, thus producing a thin coating of the record material.

In Figs. 6 and 7 there is displayed schematically the several steps in the produc-
 85 tion of a record tablet blank in accordance with the present invention, and in this schematic representation the first step in the process is the preparation of the basic disk
 90 which may, for the purposes of the invention, be considered as either a disk 1 of cardboard or pasteboard or similar material which preferably is impregnated with a sizing such as rosin or other material capable
 95 of softening when heated and which is hard and resisting when in a cold state. This sizing may or may not extend entirely through the disk but should extend to a sufficient distance into the disk from the
 100 surface thereof to maintain the fibers of the disk when they are compacted under the pressure necessary for the impress of the sound record groove, in such compressed state, by cementing such fibers together and
 105 preventing them from again expanding to their original condition when the pressure is relieved, thus preventing distortions and irregularities or other defects from being formed in the record-receiving surface.

110 In Figs. 6 and 7, such basic disk, whether formed of a suitably sized cardboard disk or a cardboard disk with a paper facing, or however formed, is indicated by the rectangle 8, and following this is another rectangle 9 which represents the step of coating
 115 the basic disk with a thin solution or emulsion of the record material, or as will hereinafter appear in connection with the method of constructing the tablet blank displayed in Fig. 6, this second step may consist in the application of shellac alone or some other like material.

Referring now to Fig. 7 only, in conjunction with Figs. 3 and 4, the rectangle 10 indi-
 125 cates a step which may follow the coating of the disk with the thin solution or emulsion of record material. According to one method of procedure, a thin sheet of fibrous material, such for instance, as cotton bat-
 130

ting, may be laid upon the wet coating formed of a thin solution of record material. In Fig. 3, the coating formed of the thin solution of record material is indicated at 11, while the fibrous material thereupon is indicated at 12. The sheet of fibrous material will take up the greater portion of the wet coating by absorption, and if the coating of record material be thick enough then the fibrous material will become entirely embedded therein and when dry may be heated and impressed with a sound record matrix. But because of the slowness of drying thick coatings of the solution or emulsion of record material, the first coating may be thin, and in order to obtain the necessary body of record material there may be an additional coating of a solution or emulsion of record material, as indicated by the rectangle 13, and following this the disk may be dried, which last step is indicated by the rectangle 14.

Instead of using a sheet of fibrous material the latter may be cut up into very short lengths and then deposited on the wet coating, and this step is indicated by the rectangle 15. After this there may be another coating of a solution or emulsion of record material, as indicated by the rectangle 16, and may be followed by drying, as indicated by the rectangle 17. Or instead of depositing the fibrous material on the wet coating, the basic disk, after being coated with a thin solution or emulsion of record material, may be dipped into a mass of finely cut fibrous material, which step is indicated by the rectangle 18, and this may afterward receive an additional coating of a solution or emulsion of record material, as indicated by the rectangle 19 to be followed by the drying indicated by the rectangle 20. In the first of the ways of applying the fibrous material described with reference to the representation of Fig. 7, the sheet of fibrous material will adhere to the wet coating and the amount of fibrous material is determined solely by the thickness of such sheet. In the case of depositing fine fibrous material on the wet coating there may be more deposited than is needed, and the surplus may be jarred off since enough of the fibrous material will adhere to the wet coating for the purposes of the invention. In the case of dipping the coated disk into a mass of the fibrous material, the latter will adhere in sufficient quantities to the surface of the disk and what fails to adhere will gravitate off the disk or may be jarred off.

In whatever manner the fibrous material is caused to adhere to the surface of the disk with its initial coating of a solution or emulsion of record material, and when the second coating of the emulsion or solution of record material is applied then there is upon the disk a coating of record material composed

of shellac and oxid of iron, if that be the particular material used, with an imprisoned mass of fibrous material, which latter is present in sufficient quantity to impart the requisite strength and resistance to the shattering action of the reproducing stylus when the deep and wide record grooves like those shown at 6 in Fig. 2 are impressed into the record surface.

In Fig. 6, there is displayed another method of producing the record surface upon a basic disk of a material not well adapted for the reproductions of sound from a groove impressed by a sound record matrix, which record surface may receive the deep and wide groove of Fig. 2, and then successfully resist the action of the reproducing stylus of the gramophone type of reproducing machine. In the process as displayed in Fig. 6, the basic disk is the same as before and is preferably made of cardboard or pasteboard, or some such material, with a sizing of rosin or other suitable material for the purpose, and with or without the interposed sheet 3 of paper. Upon this disk is produced a coating of a thin solution or emulsion of record material or this may even, under some circumstances, be a thin coating of shellac only, or in case the binding element of the record material be some other substance than shellac then the initial coating may or may not contain shellac, depending upon the binding element of the record material used.

In the method displayed in Fig. 6, the third step represented by the rectangle 21 differs somewhat from the corresponding steps in the methods represented in Fig. 7. For this third step the record material is composed of shallac, oxid of iron or other similar and suitable material, and fibrous material provided in a powdered state of sufficient fineness for the purpose, and the basic disk with its coating of a thin solution or emulsion of record or other material, while still wet is dipped in or has deposited upon it the powdered record material, which gives it all the elements of record materials used for solid disks and may be termed complete record material.

Assuming that the coating of the thin solution or emulsion of record or other material first placed upon the disk is of sufficient body, then the requisite quantity of the powdered complete record material will adhere and the surplus may be allowed to gravitate or be jarred off, and the disk so coated may be allowed to dry. When such a disk is afterward heated to the requisite degree to soften the record material and the tablet is subjected to the pressure of the matrix, then the surfacing of record material is pressed into conformity with the matrix surface and will be found of sufficient thickness and durability to successfully resist the action of

the point of the stylus of the reproducing machine the same as though a sufficiently thick coating of the record material had been originally produced upon the surface of the disk directly from a solution or emulsion of the record material. But a decided advantage arises from the production of the record-receiving surface in the manner just described, for the reason that the record material is composed of a binding material such as shellac, a hardening material such as oxid of iron or similar substance, and a strengthening material such as flock or other fibrous substance, thus permitting the production in such surface of a sound record groove of comparatively great width and depth with the separating walls so strong as to resist the action of a pointed stylus, even though these walls be comparatively thin. Furthermore, the production of a surface suitable for receiving the record impressions directly from a solution or emulsion of the record material aside from the difficulty of so producing a record surface containing flock or other such strengthening element, is necessarily a slow process, since, if a sufficiently thick coating be initially produced then the surface evaporation of the solvent forms a skin layer which retards the drying of the deeper portions of the coating for a comparatively long time. Or, if this be avoided by using several thin coatings to build up a coating of sufficient thickness, then there is the attendant multiplicity of handling and the time taken in drying, which adds very materially to the expense of producing these tablets.

By the use of a thin initial coating and then applying the fibrous material thereto, or by applying the complete record material to this thin coating while the said record material is in a powdered state, the drying is greatly facilitated because of the absorption in the fibrous material or into the powdered record material of the initial coating, whereby the exposed surface of the latter to the evaporation of the solvent is greatly enlarged and the drying proceeds at a very rapid rate. Moreover, but a small amount of solvent is necessary, and any deleterious effects of the solvent on the shellac is thereby minimized or entirely avoided.

In the process indicated in Fig. 6 another step may follow the application of the powdered complete record material, and this consists in the application of another coating of a thin solution or emulsion of record material indicated by the rectangle 22 to be followed by the drying of the tablet indicated by the rectangle 23.

In all the processes of forming the record tablet the final coating may be of a thin solution or emulsion of the record material without the fibrous material, or in the particular instance set forth, this coating con-

sists of a thin solution or emulsion of shellac with oxid of iron or other suitable hardening material.

The purpose of the second coating is to thoroughly encapsule or imprison the particles of the fibrous material, for such material is more or less hygroscopic, and when subjected to moisture, especially in damp climates, and more particularly in moist tropical climates, the fibrous material, unless protected against the moisture, is liable to absorb sufficient moisture to spoil the finished record tablet for the reproduction of sound, when the sound groove is impressed therein, because of the presence of the contained moisture, which softens the surface of the tablet so that it is no longer resistant to the point of the stylus to the extent necessary for tablets of this character.

In Fig. 5 is shown a portion of a record disk constructed in accordance with the present invention, but with the proportions greatly exaggerated. In this figure the record grooves are indicated at 24, while the record receiving material is indicated at 25 very much thicker than the paper layer 3, but this is done only for clearness of illustration, while in practice this layer 25 need not be thicker than one one-hundredth of an inch and may actually be considerably thinner.

The sizing in the basic disk 1 is indicated in the several figures by shading 26 which is not intended to illustrate the actual conditions present in the disk but simply to indicate the infiltration of the sizing into the disk, it being understood that the sizing may extend entirely through the disk or may be denser at the surface than within the disk or may under some circumstances extend but partially through the disk, it only being necessary that the fibers of the disk be sufficiently anchored by the sizing to prevent the swell of the disk after having once been subjected to the pressure used for producing the sound grooves in the surfacing of record-receiving material. The sizing also prevents absorption of the record-receiving material into the understructure.

To give a specific example, the present invention may be successfully carried out by the use of a pasteboard or cardboard disk of suitable thickness with a suitable sizing such as rosin, and upon this sized base the coating of a thin solution or emulsion of shellac and oxid of iron may be produced either directly or upon a paper disk, which in turn is applied to the sized cardboard disk. Then upon this coating while the latter is still wet, there may be produced another coating made up of a powdery mixture of shellac, oxid of iron and flock, say cotton flock, in proper proportions such as set forth in my Letters-Patent #787,001, before referred to, and sufficient of this record ma-

terial will adhere to the wet coating to produce the coating needed for the reception of the record groove. Finally, over this adherent coating of the complete record material another coating made up of a solution or emulsion of shellac and oxid of iron may be applied and the article be then dried, after which the tablet may be heated and the record groove impressed from a matrix in the usual manner.

The present invention may also be successfully carried out by the use of a fibrous understructure of suitable thickness to which the cementing layer may be applied in such manner as to infiltrate the understructure to an extent sufficient for the purposes of the invention, that is, when the tablet is subjected to heat and pressure the cementing material infiltrating the understructure will constitute a sizing which will soften under such heat, and when hardened will cement the fibers of the understructure together so that the latter will not swell after the pressure is relieved. The cementing material which may, for instance, be a shellac solution or a solution of a material which does not deteriorate the material of the record-receiving surface may be allowed to dry and may be then made adhesive by heat, and the powdered record-receiving material may then be applied to such adhesive surface. When the tablet again becomes cold the powdered material will adhere strongly to the cementing material and the tablet may again be subjected to heat and be subjected to the impress of the matrix in the usual manner. It is possible to use for the cementing and sizing material cheap grades of commercial shellac which are more or less adulterated with resinous substances, and this cementing material will not interfere to any marked extent with the record-receiving qualities of the surfacing material.

When a sizing suitable for cementing the surface material is used it may be employed in the form of a solution and be either brushed upon the fibrous base, or the latter may be dipped into the solution for a length of time determined by the depth it is desired that the sizing shall sink into the fibrous base.

When a paper sheet is interposed between the main portion of the fibrous base and the surfacing material, then the shellac solution may be used to infiltrate the paper sheet and act as a sizing therefor as well as a cement for the powdered record-receiving material.

The invention may also be successfully carried out by the application of powdered record material composed of a binder such as shellac and a hardening material such as oxid of iron or other similar material without the admixture of flock, and this record-receiving material may be deposited upon

the cementing surface or the tablet may be dipped into a mass of the powdered material either while the surface of the tablet is still wet to a greater or less degree with the solvent or when the cementing material has been permitted to dry and become hard and is then heated and softened to make it adhesive to the powdered material.

When the paper sheet is used, the base or understructure may consist of some cheap thermo-plastic material not suited for the record-receiving surface. Such material may be made up of rosin or other such material, as a binder and baryta, infusorial earth, or other like hardening material, while flock or other fibrous material may or may not be added, as desired.

From the foregoing description of the several ways of carrying out the invention it will be seen that the application of fibrous material to a suitable base in order to make a tablet having a record receiving surface coating of fiber-containing record material produced thereupon, may be performed by causing an adhesive condition of the surface of the tablet in any of the ways described, and then applying the fibrous material in a dry state to such adhesive surface whether the fibrous material be applied uncombined with other materials or whether it be an element of a composition suited for the record receiving coating of the tablet, such composition being, when applied, in a dry, powdered state.

It is not to be presumed that I am by any means limited to the several materials mentioned, for any ingredients which will answer the requirements incident to the manufacture of gramophone or disk record tablets may be used, nor am I limited in the use of hardening or both hardening and binding materials for sound record receiving surfaces, to shellac as the binder for the other elements of the record receiving material, for other resinous substances and some gums may be used for the purpose.

My invention also includes any material suitable for gramophone or disk tablet record receiving surfaces wherein the addition of cotton flock or other suitable substances is advantageous in imparting strength and reducing the brittleness or frangibility of such record receiving surfaces under the conditions of use.

What is claimed is:—

1. The method of manufacturing sound record tablets with a record-receiving surface coating of suitable fiber-containing record material, which consists in first causing an adhesive condition of the surface to be coated, then applying fibrous material in a dry state to such surface while the latter is in the adhesive condition, then permitting the surface coated to become solid or hard and anchor the powdered material thereto,

then heating the tablet to soften the record-receiving material, and impressing a sound-record matrix therein.

2. The method of manufacturing sound record tablets with a record-receiving surface coating of suitable fiber-containing record material, consisting in first applying a solution or emulsion of suitable record receiving material free from fiber containing record-material, and then applying fibrous material to the same before the solvent has evaporated.

3. In the production of sound record tablets, first providing a suitable tablet base or understructure, then applying thereto a coating of a solution or emulsion of suitable record material free from fibrous material, and then applying to the said coating suitable record material containing fibrous material, said fiber-containing record material being in dry powdered form and applied before the solvent of the first named coating has evaporated.

4. The method of producing sound record tablet blanks consisting in first coating the basic portion of the tablet with an adhesive and then applying powdered record material containing fibrous material to said adhesive while the latter is in condition to bind the powdered material to the base.

5. The method of producing sound record tablets consisting of coating the basic portion of the tablet with a thin solution or emulsion of record material, then while the first coating is still wet applying fibrous material and then applying another coating composed of a thin solution or emulsion of record material.

6. The method of producing a sound record tablet blank consisting in coating a fibrous base with a thin solution or emulsion of an adhesive suitable for use in gramophone or disk record tablets and then applying fibrous record-material in a loose state to such coating while the latter is in a condition to cement the applied fibrous material to the fibrous base.

7. The method of producing sound record tablet blanks consisting in coating a fibrous base with a thin solution or emulsion of non-fibrous record material and then applying to said coating before the solvent has evaporated a powdered record-receiving material containing fibrous material.

8. The method of producing sound record tablet blanks consisting in coating a fibrous base with a thin solution or emulsion of non-fibrous record material and then applying to said coating before the solvent has evaporated a powdered record-receiving material containing fibrous material, and then applying another coating of a thin solution or emulsion of a non-fibrous record-receiving material.

9. The method of producing sound record

tablet blanks consisting in producing upon a sized disk of fibrous material, a coating of a thin solution or emulsion of non-fibrous record-receiving material, and then applying to the said coating a powdered record material containing fibrous material, before the solvent of the initial coating has evaporated.

10. The method of producing sound record tablet blanks consisting in producing upon a sized disk of fibrous material a coating of a thin solution or emulsion of non-fibrous record-receiving material, then applying to the said coating the powdered record material containing fibrous material before the solvent of the initial coating has evaporated, and then applying another coating of a thin solution or emulsion of the non-fibrous record material.

11. The method of producing sound record tablets consisting in first producing a basic member of fibrous material sized with material capable of softening when heated, then coating the basic body with a thin solution or emulsion of non-fibrous record material also capable of softening under heat, and then producing upon the said coating before the solvent of the latter has evaporated, another coating of powdered record material containing fibrous material, said last-named record material being capable of softening under heat.

12. The method of producing sound record tablet blanks consisting in forming a base of fibrous material infiltrated with rosin, producing thereupon a coating of a thin solution or emulsion of non-fibrous record-receiving material, capable, when dry, of softening under heat, producing upon said coating while still containing solvent, a coating formed of powdered record material containing fibrous material, said last-named record material being thermo-plastic and finally producing upon the coating of powdered record material another coating of a thin solution or emulsion of the record material like that of the first-named coating.

13. The method of producing sound record tablets consisting in first producing a basic disk of fibrous material containing rosin, producing thereupon a coating from a thin solution or emulsion of a record-receiving material capable when dry of softening under heat, applying to said coating while still containing solvent, a layer of fibrous thermo-plastic record-receiving material, then producing upon a second layer a third layer composed of a thin solution or emulsion of record-receiving material like the first-named layer, then drying the tablet blank so formed and then heating the tablet blank to soften the thermo-plastic material carried thereby, and finally impressing a sound record matrix into the heated and thereby softened record surface.

14. In the manufacture of gramophone record tablets, first producing a thermoplastic fibrous base, then causing an adhesive condition of the surface of the base, then
5 producing thereupon a coating of suitable fiber-containing thermoplastic record material applied in a dry powdered condition to said surface while still in an adhesive condition, then permitting the surface of the base
10 to return to the non-adherent condition, and anchor the powdered record material thereto, then rendering the coating plastic by heat, and impressing a sound record matrix therein.

15 15. The method of manufacturing gramophone sound record tablets with a surface coating of a suitable fiber-containing record material, consisting in first producing a
20 thereto an adhesive in solution, then applying fibrous material to the adhesive before the solvent has evaporated, and then, after the adhesive has become dry, softening the

record receiving surface by heat and impressing a sound record groove therein from 25 a matrix thereof.

16. The method of manufacturing gramophone sound record tablets with a surface coating of a suitable fiber-containing record material, consisting in first producing a 30 thermoplastic fibrous base, then applying thereto a solution of record material free from fibrous material, then applying dry, powdered, fiber-containing record material, and then, after the coating has become dry, 35 softening the record receiving surface by heat and impressing a sound record groove therein from a matrix thereof.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature 40 in the presence of two witnesses.

JOSEPH SANDERS.

Witnesses:

ISAAC W. NORDLINGER,
J. THOMAS SOTHORON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DEVICE FOR REPRODUCING SOUND,

#1,192,828-----W. H. Crawford,

Patented-July 25th, 1916.

Filed-April 29th, 1915.

W. H. CRAWFORD.
 DEVICE FOR REPRODUCING SOUND.
 APPLICATION FILED APR. 29, 1915.

1,192,828.

Patented July 25, 1916.

Fig. 1.

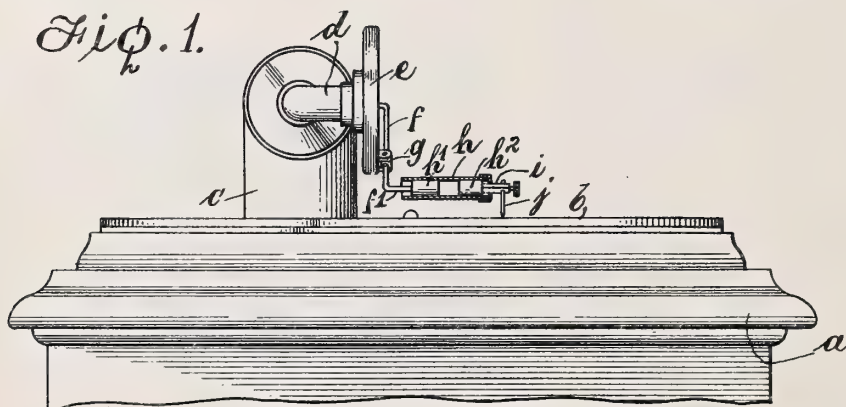


Fig. 2.

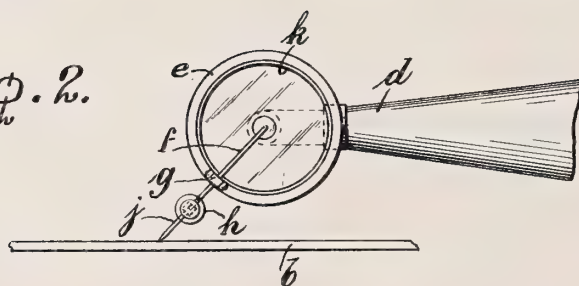
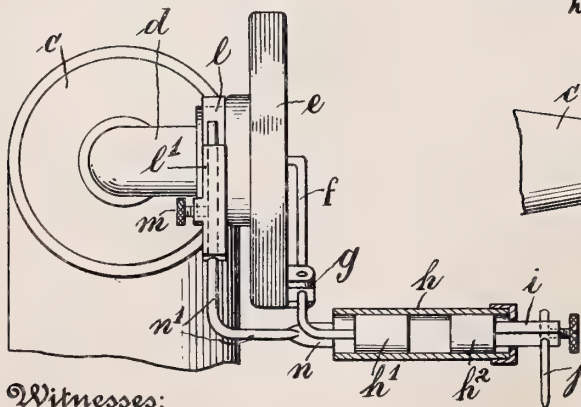


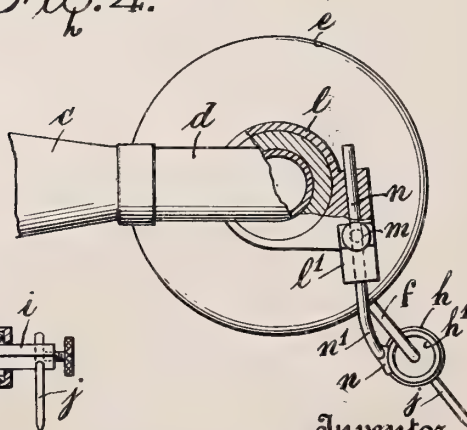
Fig. 3.



Witnesses:

Wm. H. Hawkins

Fig. 4.



Inventor

William H. Crawford

By his Attorney

L. H. Schmitt

UNITED STATES PATENT OFFICE.

WILLIAM H. CRAWFORD, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR OF ONE-HALF TO
OLIVER FLETCHER BEST, OF PROVIDENCE, RHODE ISLAND.

DEVICE FOR REPRODUCING SOUND.

1,192,828.

Specification of Letters Patent.

Patented July 25, 1916.

Application filed April 29, 1915. Serial No. 24,625.

To all whom it may concern:

Be it known that I, WILLIAM H. CRAWFORD, a citizen of the United States of America, and a resident of Providence, county of Providence, State of Rhode Island, have invented certain new and useful Improvements in Devices for Reproducing Sound, of which the following is a specification.

This invention has reference to improvements in a device for reproducing sound, especially in talking machines and the like.

When music, articulate speech and other sounds are reproduced, in a phonograph for instance, thin shrieking sounds and secondary noises are audible which distract the attention of the listeners, impair the quality of the tone and thereby lessen the impression intended to be created.

In order to eliminate the disagreeable sounds and secondary noises and reproduce the sound in unimpaired quality of tone, I have devised novel means for reproducing sound. These novel means receive and transmit the original vibrations, produced when the stylus passes through the record grooves, to the rod fulcrumed to the sound box which in turn acts on the diaphragm and thereby the original vibrations are repeated. The novel improvements have been attained by providing means capable of confining an elastic medium, between the stylus and the rod which is fulcrumed to the sound box. In this way the original vibrations are imparted to an elastic medium, such as air, before being further transmitted. This results in the elimination of the disagreeable sounds and secondary noises. It is known that a confined body of an elastic medium or fluid, such as air is capable of transmitting sympathetic vibrations and the interposition of a confined body of an elastic medium eliminates disagreeable sounds and secondary noises. The reproduced sound resulting from the repeated vibrations of the diaphragm is further conveyed from the reproducer or sound box into the amplifier in the usual manner except that no disagreeable sounds or secondary noises are conveyed and amplified but merely pure tones.

The invention is illustrated in the accompanying drawing in which:

Figure 1 represents in side elevation a phonograph embodying in desirable form

the present improvements. Fig. 2 illustrates part of the device shown in Fig. 1 in front elevation. Fig. 3 is an enlarged view of the upper mechanism shown in Fig. 1, certain parts being in section. Fig. 4 is a rear view of Fig. 3, partly broken away.

Similar characters of reference denote like parts in all the figures.

In the drawings, in Fig. 1, *a* represents the phonograph box and *b* is the record. The amplifying horn *c* is partly shown and the reproducer connection *d* is in communication with the reproducer or sound box *e*. From the sound box the rod *f* which acts on the diaphragm *h*, as shown in Fig. 2, extends downwardly and is fulcrumed to the sound box *e* as shown at *g*. The rod *f* is bent horizontally below the fulcrum *g* and extends into a small cylinder *h* which houses two small pistons *h*¹, *h*². The horizontal portion *f*¹ of the rod *f* is connected to the small piston *h*¹. Between the two small pistons there is a space which is adapted to confine an elastic medium, such as air. The small piston *h*² carries a horizontal support *i* in which the stylus *j* is adjustably secured.

The cylinder *h* carrying the two small pistons *h*¹, *h*² may be supported on the machine by means of a ring *l* mounted behind the sound box *e* adjoining to the reproducer connection *d*. Integral with the ring *l* there is a vertical support *l*¹. The support *l*¹ forms a tube through which passes a set screw *m*. To the cylinder *h* a horizontal supporting member *n* is secured as shown to the left in Fig. 3. From the support *n* a connecting rod *n*¹ extends first horizontally and then vertically into the support *l*¹ and is adjustably held therein. This allows of a slight adjustment of the cylinder *h* with the pistons therein which support one the rod *f* and the other the stylus support *i*.

Assuming that a new stylus has been inserted into the stylus support and properly adjusted therein then, upon starting the machine, the stylus travels in the record grooves and the original vibrations will be transmitted through the stylus support, the piston *h*², the confined body of an elastic element, such as air, the piston *h*¹ and the fulcrumed rod *f* which acts on the diaphragm whereby the original vibrations are repeated and sound is reproduced. For the reasons herein stated the body of the confined elastic element eliminates the disagree-

able sounds and secondary noises and solely pure tones are reproduced in the reproducer or sound box.

I claim as my invention:

5 1. In a talking machine and the like, a device for reproducing sound having means for transmitting the original vibrations comprising a cylinder, two pistons in the cylinder leaving a space between them where-
10 in air is confined, a rod on one piston connecting with the sound box, a support on the other piston, and a stylus in the said support.

2. In a talking machine and the like, a
15 device for reproducing sound having means for transmitting the original vibrations comprising a cylinder, two pistons in the cylinder wherein an elastic fluid is confined, a rod on one piston, a diaphragm on which

the said rod acts, a support on the second 20 piston, and a stylus therein.

3. In a talking machine and the like, a device for reproducing sound having means for transmitting the original vibrations comprising a cylinder, two pistons in the 25 cylinder leaving a space between them wherein an elastic fluid is confined, a fulcrumed rod on one piston, a diaphragm on which the rod acts, a stylus support on the second piston a stylus therein and means for 30 supporting the cylinder.

Signed at New York N. Y., this 27th day of April, 1915.

WILLIAM H. CRAWFORD.

Witnesses:

IDA C. ROLAND,
ELEANORE J. HOFFMANN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND BOX,
#1,192,833-----J. A. Steurer,
Patented-July 25th, 1916.
Filed-November 18th, 1915.

J. A. STEURER.
SOUND BOX.
APPLICATION FILED NOV. 18, 1915.

1,192,833.

Patented July 25, 1916.

Fig. 1

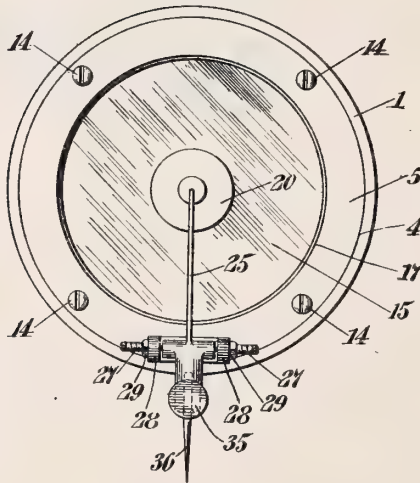


Fig. 3

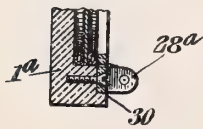


Fig. 2

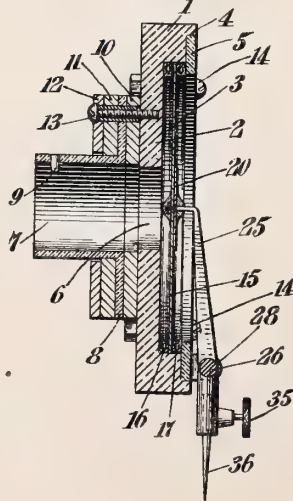


Fig. 5

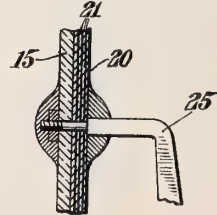
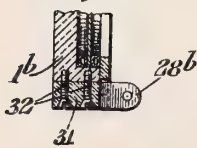


Fig. 4



John A. Steurer ^{INVENTOR}
BY *Whitcomb* ^{BY}
ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN A. STEURER, OF NEW YORK, N. Y.

SOUND-BOX.

1,192,833.

Specification of Letters Patent.

Patented July 25, 1916.

Application filed November 18, 1915. Serial No. 62,126.

To all whom it may concern:

Be it known that I, JOHN A. STEURER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Sound-Boxes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in the novel features hereinafter described reference being had to the accompanying drawing in which is shown one embodiment of my invention selected by me for purposes of illustration together with several slight modifications of the same, and said invention is fully disclosed in the following description and claims.

In the use of the reproducing devices or sound boxes of talking machines two objectionable features stand out prominently. One is the metallic resonance which is usually produced in a greater or lesser extent in practically all sound boxes, and another is the muffling of certain sounds which I attribute to the interference with the vibration of the diaphragm at and adjacent to the point of connection between the stylus arm and the diaphragm, that is to say at its central portion. This latter muffling or damping of the tone at the center of the diaphragm is also observed in the use of practically all forms of sound boxes with which I am familiar, and produces a muddiness or lack of clarity of tone which seriously mars the perfection of reproduction and is perhaps especially noticeable in reproducing from records of the human voice and of the concerted instrumental selections.

According to my invention I employ a non-metallic diaphragm, preferably of mica, and I adhesively secure to one face of the diaphragm a disk of thin sheet material which is non-absorbent, water-proof, unaffected by heat or cold, and which will therefore never warp or crack, and preferably of material which combines the qualities of a solid quasi-vitreous base with those of a fibrous material. The specific material, which as a result of many experiments I have found to give the best results, is what is known in the trade as bakelite dilecto which is a composite body comprising sheets of paper impregnated with bakelite or com-

positions containing bakelite, and condensed or compressed to form a substantially integral body, which is obtainable in the trade either in sheets or blocks. I have found that this particular material combining as it does the resonant qualities of the quasi-vitreous bakelite and modified by the strata of fibrous material is particularly advantageous and gives remarkable results. In practice I apply a disk of this material to the exterior face of the non-metallic diaphragm (preferably mica) cementing it thereto throughout the entire adjacent surface, the disk being concentric with the diaphragm extending a greater or lesser distance toward the extreme marginal portions of the diaphragm. I have found in practice that the size of the disk may be varied from a disk of comparatively small diameter to a disk of substantially the same diameter as the diaphragm according to the particular amplifying devices of the phonograph or other talking machine with which the sound box is used. The effect of this disk is to clarify the tone produced by the diaphragm eliminating substantially all metallic resonance and also eliminating the muffled effect usually produced in talking machines, rendering with perfect clarity both the tones and over-tones of the human voice and the various musical instruments whether used separately or in concerted music. I have also found that in connection with the non-metallic diaphragm provided with the described clarifying disk the beneficial results are obtained more certainly and to a more perfect degree by employing the disk in connection with a sound box having a non-metallic body and in which the supports for the stylus arm are connected directly to the non-metallic body instead of to any metallic portion of the sound box, and in the preferred form of my invention herein illustrated and described I form the body of the sound box also of bakelite dilecto, thus not only eliminating still further the tendency to metallic resonance but providing a support for the diaphragm, and stylus arm having similar characteristics to those of the clarifying disk, and cooperating therewith in producing pure tones and over-tones.

In the accompanying drawings: Figure 1 represents a front elevation of a sound box or reproducing device constructed according to and embodying my invention. Fig. 2 is a vertical sectional view of the same.

Figs. 3 and 4 are detail views of a portion of the device showing slightly modified arrangements for mounting the stylus arm. Fig. 5 is a magnified partial section of the diaphragm and disk.

Referring to the drawings, 1 represents the body of the sound box which is of the usual form and is preferably formed of non-metallic material, preferably a combination of quasi-vitreous material and fibrous material, and for this purpose I prefer to employ bakelite dilecto which is turned from a solid block so as to provide the rear wall, 2, the diaphragm recess 3, and a recess, 4, of larger diameter to receive the diaphragm retaining ring, 5, which is also preferably made of the same material. All the parts of the sound box which are formed of bakelite dilecto have the strata of fibrous material extending in planes parallel with the diaphragm. The rear wall, 2, is provided with the usual aperture 6 to communicate with the collar or fitting, 7, provided with a lateral flange, 8, which is secured to the body of the sound box, the said collar, 7, being adapted to be connected to the portion of the phonograph or other instrument leading to the amplifying horn or mechanism in the usual manner, and being preferably provided with the usual locking stud, 9.

I prefer to form the collar, 7, with its flange, 8, of bakelite dilecto although it may be formed of metal or other material if desired. I also prefer to introduce a washer, 10, between the flange, 8, of the collar and the rear wall of the sound box, and to provide another washer, 11, surrounding the collar, 7, on the exterior face of the flange, 8, and to provide a clamping ring, 12, engaging the last mentioned washer, the clamping ring being connected to the sound box by suitable connections as the screws, 13, passing through apertures in the washers, 10, and 11, and the flange, 8, of the collar to secure the parts together in proper relation to the sound box. The washers, 10 and 11, may be of rubber or I may employ bakelite dilecto for this purpose also, and the clamping ring, 12, is preferably of bakelite dilecto or other non-metallic material, although in some instances I may employ a metal clamping ring in which case I prefer to make the inner diameter of the ring of such a size that it will not come in contact with the collar, 7, as shown.

15 represents the diaphragm which is preferably non-metallic and preferably formed of mica, the outer edges of the diaphragm being supported by the usual cushion rings, 16 and 17, held in place by the retaining ring, 5, which is connected to the body of the sound box by the screws, 14, or otherwise. The diaphragm is provided with the clarifying disk, 20, which is formed of a thin sheet of bakelite dilecto with the fibrous

material 21 thereof lying in planes parallel to the plane of the diaphragm, and cemented to the diaphragm throughout the contacting surfaces thereof by a cement which is not affected by heat, cold or moisture or other atmospheric conditions, which is also true of the clarifying disk itself.

In the drawing I have shown the clarifying disk as extending over the central portion of the diaphragm only and located concentrically therewith. It is to be understood that it may extend a greater or less distance from the center to the periphery of the diaphragm according to the conditions under which it is to be used, and in some instances it may be co-extensive with the diaphragm although I prefer to have it of less diameter than the diaphragm. As a matter of experience I have found that the size of the disk which gives the best results varies somewhat with the size and character of the amplifying horn or other amplifying mechanism employed in the instrument with which the sound box is used, a comparatively small disk giving good results with a large horn and vice versa.

The stylus arm, 25, is of the usual or any preferred form, the upper end having a shoulder portion and a threaded portion of similar diameter extending through a central aperture in the clarifying disk, and through the diaphragm and being secured in position by a nut in the usual manner, a minute quantity of wax being applied around the nut, and the stem of the stylus arm on the inner face of the diaphragm, and on the exterior face of the disk in the usual manner as shown. The stylus arm is provided with a pivot engaging portion, 26, which is preferably engaged by two pivot screws, 27, extending through ears, 28, and provided with set nuts, 29, although other forms of mountings for the stylus arm may be substituted for those herein shown and described.

In Figs. 1 and 2 I have shown the ears, 28, which are preferably formed of non-metallic material, for example bakelite dilecto, made integral with or secured to the retaining ring, 5, so as to avoid the possibility of any metallic resonance from the pivotal connection of the stylus arm. In some instances I may form a notch or recess in the retaining ring, 5, as shown in Fig. 3 and provide a mounting, 30, having ears, 28^a, formed thereon, said mounting being directly connected to the non-metallic body, 1^a, of the sound box so as to transfer the support for the stylus arm from the retaining ring to the body of the sound box as shown in said figure. In such case the mounting might be made of metal although I prefer that it should be of non-metallic material.

In Fig. 4 I have shown another slight

modification in which the body here indicated at 1^b of the sound box is provided with a recess or notch in which is located a block, 31, preferably of non-metallic material, and preferably of bakelite dilecto, provided with the ears, 28^b, said block fitting in said notch and extending through a corresponding recess in the retaining ring and being secured to the body of the sound box by screws, 32.

In all of these constructions it will be noted that there can be no metallic vibration at the point of pivoting to communicate itself to the diaphragm through the stylus arm or through the non-metallic body of the sound box. The stylus arm is provided with the usual needle recess and clamping screw 35, a needle being shown in position at, 36.

In the use of my improved sound box it will be found that the clarifying disk of bakelite dilecto modifies the delicately responsive non-metallic mica diaphragm to which it is so intimately connected, in such manner as to eliminate all metallic sounds and prevent the blending or muffling of tones, all the tones as well as the most minute over-tones being rendered with perfect clarity and distinctness and resulting in the perfect versimilitude of the human voice or voices or musical instrument or instruments the tones of which are reproduced. The non-metallic body of the sound box, also preferably of bakelite dilecto, and the mounting of the stylus arm directly thereupon preferably without the intervention of any direct metallic contact in the manner described also coöperates with the clarifying disk in more perfectly eliminating the metallic resonance and clarifying the tone reproduced.

I attribute the results obtained by my improved sound box to the use of the clarifying disk and body composed of quasi-vitreous material combined with fibrous material, the best form of which I consider to be bakelite dilecto. By the term quasi-vitreous I mean a material like bakelite which is hard, glass-like and of uniform density, while at the same time it is tough and not so brittle as glass, and is not under any internal or external stress, as truly vitreous material is apt to be. This peculiarity in combination with the fibrous material causes a resultant material which possesses the desired quality of resonance together with the requisite flexibility and at the same time is incapable of warping and is not affected by atmospheric conditions of any kind. The clarifying disk of bakelite dilecto on account of its peculiar qualities also coöperates with the non-metallic mica disk in preventing the splintering or separation of the almost infinitesimally thin strata along their planes of cleavage of the mica at and adjacent to

the center of the diaphragm where the stylus arm is connected, and thus prevents the deterioration of the mica diaphragm which otherwise is extremely likely to result with continued use.

In the practical use of sound boxes in which my improved clarifying disk is used, I find that a greater volume of sound is obtained with a smaller or lighter needle than is possible with other forms of sound boxes and this in itself is a desirable feature of my invention as it materially lessens the wear on the grooves of the records.

The beneficial results obtained by my improved clarifying disk herein described are also obtained in a considerable degree in connection with metallic diaphragms or diaphragms having metallic portions such as are used for example in telephonic apparatus. In connection with these diaphragms also the provision of the concentric clarifying disk results in eliminating muddy and confused tones and rendering the reproduction clear, and in which the metallic resonance is greatly reduced.

By the term bakelite as used in the foregoing specification and in the following claims I mean a phenolic condensation product formed by combining a phenolic body with formaldehyde, which is best known by one of its trade names bakelite.

My improved sound reproducing box is not specifically claimed herein as it forms the subject matter of a separate application for Letters Patent of the United States filed by me on or about June 2, 1916, and given Serial No. 101,252, the same being a division of this application.

What I claim and desire to secure by Letters Patent is:

1. In a sound reproducing apparatus, the combination with a diaphragm of a concentric clarifying disk of a phenolic condensation product having embodied therein strata of fibrous material, parallel with the diaphragm, the said disk being adhesively secured to the diaphragm throughout their adjacent surfaces.

2. In a sound reproducing apparatus, the combination with a diaphragm of a concentric clarifying disk composed of bakelite having embodied therein strata of fibrous material parallel with the diaphragm, said disk being cemented to the diaphragm throughout their adjacent surfaces.

3. In a sound reproducing apparatus, the combination with a diaphragm of a concentric clarifying disk composed of bakelite dilecto cemented to the diaphragm throughout their adjacent surfaces.

In testimony whereof I affix my signature.

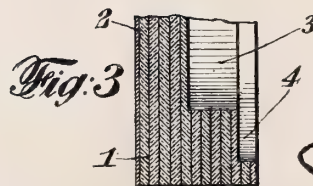
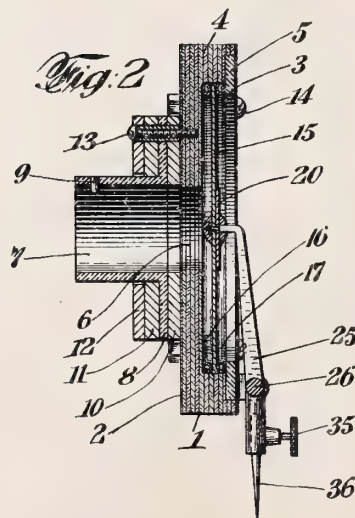
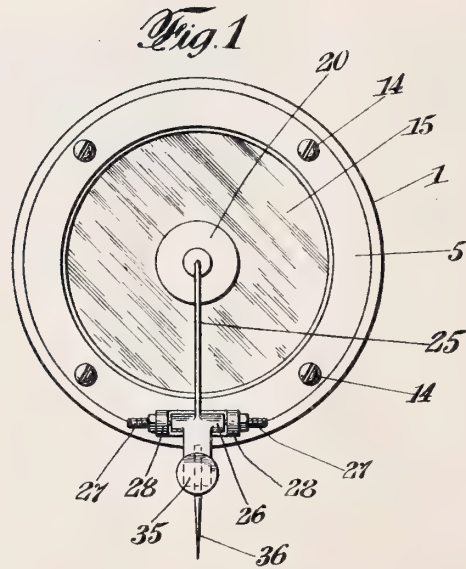
JOHN A. STEURER.

SOUND REPRODUCING BOX,
#1,192,834-----J. A. Steurer,
Patented-July 25th, 1916.
Filed-June 2nd, 1916.

J. A. STEURER.
SOUND REPRODUCING BOX.
APPLICATION FILED JUNE 2, 1916.

1,192,834.

Patented July 25, 1916.



John A. Steurer INVENTOR
BY Whitaker & Peterson ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN A. STEURER, OF NEW YORK, N. Y.

SOUND-REPRODUCING BOX.

1,192,834.

Specification of Letters Patent.

Patented July 25, 1916.

Original application filed November 18, 1915, Serial No. 62,126. Divided and this application filed June 2, 1916. Serial No. 101,252.

To all whom it may concern:

Be it known that I, JOHN A. STEURER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Sound-Reproducing Boxes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in the novel features hereinafter described, reference being had to the accompanying drawing in which is shown one embodiment of my invention selected by me for purposes of illustration and the said invention is fully disclosed in the following description and claims.

Referring to the accompanying drawing: Figure 1 represents a front elevation of a sound box or sound reproducing device suitable for use in connection with a talking machine and having my invention embodied therein. Fig. 2 is a vertical sectional view of the same, the stratification of the box body being illustrated in somewhat exaggerated manner for greater clearness. Fig. 3 is an enlarged detail view of a portion of the box body, which supports the diaphragm in which the stratification is still further exaggerated.

In the use of sound reproducing devices, for example, such as sound boxes of talking machines, a metallic resonance is usually produced in a greater or less extent, and the object of my invention is to produce a new body for a sound reproducing device for supporting the diaphragm member of such device, which is so constructed that this metallic resonance is substantially entirely eliminated so that all sounds are reproduced with the utmost accuracy and without attendant metallic tones.

In carrying out my invention, I preferably form the sound box body of a stratified material having the strata thereof lying, preferably, in planes parallel with the diaphragm and composed of material which is non-absorbent, water-proof, unaffected by heat or cold, and which will, therefore, never warp or crack, and preferably of material which combines the qualities of a solid quasi-vitreous body with those of a fibrous material. The specific material which as a result of many experiments I have found to give the best results is what is

known in the trade as bakelite dilecto, which is a composite body comprising sheets of paper impregnated with bakelite or compositions containing bakelite and condensed or compressed to form a substantially solid integral body, which material is obtainable in the trade in sheets and blocks. By the term quasi-vitreous, I mean a material like bakelite, which is hard glass-like, and of uniform density, while at the same time it is tough and not so brittle as glass, and is not under any integral or external stress as truly vitreous material is apt to be. This peculiarity in combination with the fibrous material causes a resultant material and structure which possesses, when given the desired form of a sound box, the quality of resonance and absolute freedom from metallic tone, and at the same time, it is incapable of warping, and is not affected by

Referring to the drawing; 1, represents the body of a sound box for a talking machine embodying my invention, which is of the usual form, and is composed of strata of fibrous material or fabric and quasi-vitreous material combined therewith into an integral structure having the planes of its strata preferably substantially parallel with the plane of the diaphragm, the said box being preferably made of bakelite-dilecto, which is turned from a solid block so as to provide the rear wall, 2, the diaphragm recess, 3, and a recess, 4, of larger diameter to receive the diaphragm retaining ring, 5, which may be and preferably is made of the same material. The rear wall, 2, is provided with the usual aperture, 6, to communicate with the collar or fittings, 7, provided with a lateral flange, 8, which is secured to the body, 1, of the sound box, the collar, 7, being adapted to be connected to the portion of the talking machine or other instrument leading to the amplifying horn or mechanism in the usual manner, and being preferably provided with the usual locking stud, 9.

I prefer to form the collar, 7, with its flange, 8, of bakelite-dilecto, although it may be formed of metal or other material, if desired. I also prefer to introduce a washer, 10, between the flange, 8, of the collar and the rear wall of the sound box, and to provide another washer 11, surrounding the collar, 7, on the exterior of the flange, 8, and to provide a clamping ring, 12, engaging the last mentioned washer, the clamping

ring being connected to the sound box by suitable connections as screws, 13, passing through apertures in the washers, 10 and 11, and the flange, 8, of the collar to secure the
 5 parts together with proper relation to the sound box. The washers, 10 and 11, may be of rubber, or I may employ bakelite-dilecto for this purpose, and the clamping ring, 12, is preferably of bakelite-dilecto or other
 10 non-metallic material, although, in some instances, I may employ a metal clamping ring, in which case I prefer to make the inner diameter of the ring of such a size that it will not come in contact with the collar,
 15 7, as shown.

15 represents the diaphragm, which is preferably non-metallic, and preferably formed of mica, the outer edges of the diaphragm being supported by the usual cushion rings, 16 and 17, held in place by the retaining ring, 5, which is connected to the body by screws, 14, or otherwise. I prefer to provide the diaphragm with a clarifying disk, 20, formed of a thin sheet of bakelite-dilecto
 25 with the fibrous material, 21, thereof lying in planes parallel to the plane of the diaphragm, and cemented to the diaphragm throughout the contacting surfaces thereof by a cement which is not affected by heat,
 30 cold, moisture or other atmospheric conditions. This clarifying disk, however, forms no part of my present invention as it is described and claimed in my former application for Letters Patent of the United States,
 35 filed November 18th 1915, Serial #62,126 of which this application is a division.

Where the sound reproducing device is used in connection with a talking machine, it will be provided with the usual pivoted
 40 stylus arm, 25, of any usual or preferred form, the upper end being connected to the diaphragm and the lower end provided with a suitable recess to receive the stylus, 36, which may be held in position by a set screw,
 45 35. The stylus arm is provided with a pivot engaging portion, 26, in this instance, engaged by pivot screws, 27, passing through ears, 28, which may be secured to the sound box body in any desired manner or to the
 50 retaining ring, 5.

It will be seen that the body of the sound box consists of a stratified structure composed of fibrous material and quasi-vitreous material, as before described, arranged in strata parallel with the diaphragm, and it
 55 is found in practice that my improved sound box eliminates the metallic resonance usually found in sound boxes having metallic bodies, while its built-up structure and the combined qualities of the quasi-vitreous and
 60 fibrous material gives it a greater degree of resonance than could be obtained with an amorphous non-metallic material, while at the same time, it is incapable of warping or cracking, and is not affected by atmospheric
 65 conditions. I prefer to use it in connection with a mica diaphragm having the clarifying disk, 20, covered by my former application, but this is not essential, as it may be used with any other form of diaphragm.
 70

By the term bakelite as used in the foregoing specification and in the following claims, I mean a phenolic condensation product formed by combining a phenolic body with formaldehyde, which is best
 75 known by one of its trade names bakelite.

What I claim and desire to secure by Letters Patent is:

1. In a sound reproducing apparatus, a diaphragm supporting box formed of a phenolic condensation product having fibrous material embedded therein.

2. In a sound reproducing apparatus, a diaphragm supporting box formed of a phenolic condensation product and fibrous material in stratified relation, and having the strata thereof extending substantially parallel with the diaphragm.

3. In a sound reproducing apparatus, a diaphragm supporting box composed of bakelite having fibrous material embodied therein.

4. In a sound reproducing apparatus, a diaphragm supporting box composed of bakelite dilecto having the fibrous material thereof disposed in planes substantially parallel to the diaphragm.

In testimony whereof I affix my signature.

JOHN A. STEURER.

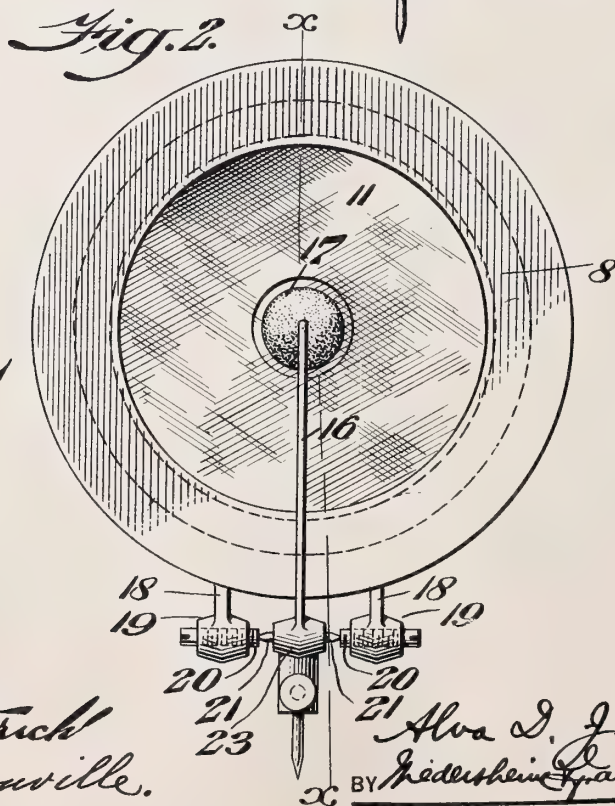
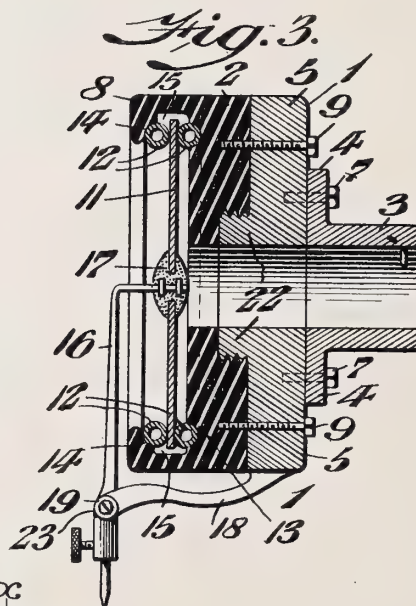
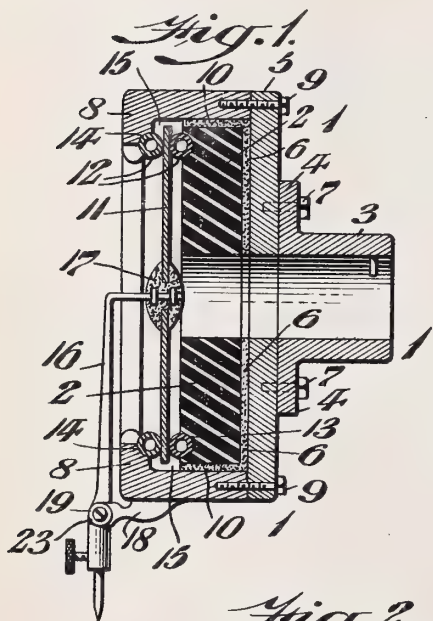
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND BOX FOR TALKING MACHINES,
#1,192,836-----A. D. Jones,
Patented-July 25th, 1916.
Filed-January 29th, 1916.

A. D. JONES.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED JAN. 29, 1916.

1,192,836.

Patented July 25, 1916.



WITNESSES

H. E. Dieterich
L. Rouville.

INVENTOR

Alva D. Jones.
BY *Hedderheim & Graubauer*
ATTORNEYS

UNITED STATES PATENT OFFICE.

ALVA D. JONES, OF PHILADELPHIA, PENNSYLVANIA.

SOUND-BOX FOR TALKING-MACHINES.

1,192,836.

Specification of Letters Patent.

Patented July 25, 1916.

Original application filed November 23, 1914, Serial No. 873,500. Divided and this application filed January 29, 1916. Serial No. 74,981.

To all whom it may concern:

Be it known that I, ALVA D. JONES, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Sound-Box for Talking-Machines, of which the following is a specification.

It is well known that sound boxes of the character in general use frequently emit a metallic or scratchy sound which it is the object of my invention to overcome entirely or reduce to a minimum.

I have discovered as the result of a long series of experiments that rubber has a valuable function when incorporated in a sound box in such a way that it is exposed to the atmospheric displacement resulting from the movement of the diaphragm. While I have secured good results from soft rubber, I find that hard rubber is far superior, as it assists in increasing the volume without changing the speed of the vibrations or the tonal qualities thereof, and I find that the best results are obtained by using a hard rubber back, as this is the part of the instrument that is exposed to the greatest movement outside of the diaphragm resulting from the sound waves, as it must deflect the sound in the direction of the horn.

The advantage of a hard rubber back over a metal back is very great, as metal has a distinctive characteristic tonal quality peculiar to its shape, the kind of metal and its size, and when exposed to the direct blast of a volume of sound, is caused to vibrate with considerable intensity, being excited in one instance directly through the pivot or fulcrum point and in the other instance directly through the action of the diaphragm upon the atmosphere existing between the diaphragm and the metal back. I have found that metal backed instruments for the above reasons, emit a distinctive metallic sound which is of low tonal quality, yet extremely sharp or high pitched due to the fact that the speed of vibrations is much faster in the case of metal and its extreme tendency to sympathize and greatly intensify sounds resulting from brass or other metallic instruments. Rubber being practically void of resonance, yet extremely vibrant is by far the most valuable of substances to form the sound deflecting back of a sound reproducing instrument for the last reasons mentioned, and in my exhaustive experi-

ments I have found that the good results in a sound box depend upon the amount of rubber used, as is disclosed in some of my prior patents in which I use all rubber of varied degrees of density and I have preferably had them constructed and cured in such a way that the back portion of the instrument would be hard rubber, as hard as it could possible be cured, and I preferably use metal to supply the small added weight which it would afford, and in these cases, I have found it preferable to surround it and cure it into rubber in order to prevent the ill effects of the metal.

I have discovered as the result of a long series of experiments that rubber cured to a predetermined degree and incorporated in a sound box, in accordance with my invention so as to form the back or body thereof as hereinafter described, possesses characteristics which simulate the sound producing qualities of the human throat and free the instrument from metallic tones.

In its broad aspects, my present invention is a division of an application filed by me November 23rd, 1914, Serial No. 873,500, and comprises a thickened, hardened wall of rubber with respect to which the diaphragm is so mounted as to be capable of such movement as will cause the sound delivered by it referably to said rubber wall, to be distinctly articulated and mellowed, said rubber wall serving as a carrier or support not only for the diaphragm and its adjuncts but also for the rearwardly extending coupling device or its adjuncts, whereby the sound box is coupled to the tone arm which conveys the sound to the desired point, the box as an entirety and its adjuncts being inexpensive of construction, extremely sensitive in action, easily and quickly repaired and most effective and natural in tone reproduction.

To the above ends, my invention in its broad aspects comprises in a sound box, the combination of a hardened rubber disk, back or body, having an opening through the center thereof, said body carrying at its rear portion a flanged rearwardly extended sleeve or coupling member adapted to engage the tone arm of a talking machine of the desired type, while said same hardened rubber body also serves as a carrier for a metallic annular member having a pair of integral lugs for pivotally supporting the stylus bar

and said annular member also having an inwardly projecting annular ring portion provided with a gasket retaining lip, said lip holding in position between it and said

5 rubber back, a pair of annular gaskets between which a diaphragm is held, the stylus bar being secured at its inner end to said diaphragm and pivotally supported at its outer portion between said lugs.

10 It further consists of other novel features of construction, all as will be hereinafter fully set forth.

For the purpose of illustrating my invention, I have shown in the accompanying

15 drawings one form thereof which is at present preferred by me, since the same will give in practice satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my

20 invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

25 Figure 1 represents a vertical section on line $x-x$ Fig. 2 of a sound box embodying my invention. Fig. 2 represents, on an enlarged scale, a front elevation of Fig. 1. Fig. 3 represents a view similar to that of

30 Fig. 1, of a modified form of construction. Similar numerals of reference indicate corresponding parts in the figures.

Referring first to Figs. 1 and 2,—1 designates the sound box proper, and 2 designates the hardened, thickened disk, wall, or body-portion, composed of hard rubber or similar material, cured to a predetermined hardness and having a central opening there-through.

3 3 designates a rearwardly extending flanged metallic neck having a flange 4, secured to the back plate or disk 5, which is cemented to the wall or body 2, as shown at 6. The back plate 5 is of greater diameter

45 than the flange 4 and although it forms a convenient connecting device between the metallic neck 3 and the body of the box, this construction is not essential, as it is obvious that the flange 4 of the neck may

50 be directly secured to the body 2 by screws or bolts 7, which instead of being threaded into said back plate 5, may be threaded directly into the body portion 2, as the added weight secured by the plate 5 may be incorporated in the metal part encircling the

55 hard rubber back as the vital feature is the function of the hard rubber back being exposed to the sound waves.

8 designates a forwardly projecting metallic ring or annular member having an inwardly turned, annular lip, and secured to the rubber disk, back or body 2 by any suitable means, as cement 10. If desired, bolts or screws 9 may be employed to secure the

65 plate 5 to the lip 8, although it will be ap-

parent that the cement 10 will suffice to effectively secure the lip 8 to the rubber disk or body 2, and the cement 6 will efficiently secure the plate 5 to said disk 2. I do not, however, desire to be limited to any particular securing means for holding the back 2, lip 8 and neck 3 in position upon the common carrier 2, as it will be evident that other fastening devices than those shown may be employed as it is the function of the hard

75 rubber back that is of the greatest importance and as stated the necessary weight may be embodied in the frame surrounding the latter. The value of hard rubber with respect to its function is clearly illustrated

80 in Fig. 3. Obviously however, the lip 8 may be integral with the body as in the construction seen in Fig. 3,—its function in connection with the gaskets 12 being to secure the diaphragm 11 with respect to the body

85 through the intervention of said gaskets.

The diaphragm may be of any usual character or desired material and is retained in position between the intumed lip 8 and the body 2 by the gaskets 12, above referred

90 to, one upon the inside and the other upon the outside, and each preferably in the form of a hollow tubular body of soft rubber. The tubular feature of the gaskets is, however, unessential, although the cylindrical

95 form is preferable because making it possible properly to seat each gasket relatively to the other, the inner one by laying it within a circular seat 13 channeled or grooved in the front face of the body 2,

100 and the outer one against a chambered or concave edge 14 of the lip 8.

15 15 designates a circumferential recess formed within the lip 8, which, being of greater internal diameter than the external

105 diameter of the diaphragm, permits the diaphragm to have its requisite radial vibratory movement.

16 designates a stylus bar, the inner end of which is connected with the diaphragm

110 by any convenient means, as the connection 17.

18 designates lugs or carrying arms for the boxings 19 of the bearings 20 against which the points of the pivot pin 21 of the

115 stylus arm bear in a manner well understood in this art, said arms being preferably integral with the annular metallic member 8, and the pin 21 being staked in the lower portion 22 of the stylus bar 16. The carry-

120 ing arms 18 may be integral with the annular metallic lip or member 8, as shown in Figs. 1 and 2, or may project from the flange or back plate 5 of the neck, as in Fig. 3. In the construction seen in Fig. 3,

125 the annular intumed lip, as already explained, is integral with the body portion of the box, that is to say, is not made of metal but of the rubber of which the body

130 is composed. In this construction, the back

plate 5 of the neck 3 is formed with a forwardly-extended externally threaded boss 22 which is in threaded engagement with the body 2, the screws or bolts 9 in this construction engaging the body 2. The organization of this modified construction so far as regards the diaphragm, gaskets, stylus bar and its carrying connections, is identical with that of the construction of Figs. 1 and 2.

I desire to call special attention to the fact that in the construction seen in Figs. 1 and 2, the hard rubber back 2, serves as a carrier not only for the rearwardly extending neck 3 but also for the annular metallic member or lip 8, the latter being cemented to said body, as indicated at 10, while said neck 3, which is practically integral with the plate 5, when the parts are assembled, is also carried by said hard rubber body 2, since the cement 6 serves to firmly secure in position said plate 5, the latter and said flange 4, when assembled, having substantially the same function, as if they were made integral, as will be apparent.

In the operation of my device, it will be apparent that any scratchy or metallic tones or surface noises will be absorbed by the hard rubber back 2, which acts as a carrier for the neck 3 and the lip 8, as stated, and the resultant tones will be found to be entirely free from any metallic sounds.

I am aware that it has heretofore been proposed to make use of rubber as an element of a sound box, as shown in the French patent to Bontchev, No. 370,812, but my device differs therefrom, since my thickened hard rubber back has an opening therethrough, and said hard rubber back further serves not only as a carrier for the rearwardly extending neck 3, which aligns with said opening, but also as a carrier for the annular metallic member 8 having the lugs 18 and an inwardly turned annular lip, between which a plurality of gaskets are held, and in addition, my stylus bar is located wholly without the sound box body proper, and has its outer end pivotally supported with respect to said lugs, which constructions are not present in said Bontchev patent. My invention is further differentiated from Bontchev, since I mount the outer end of the stylus bar having the pivot pin staked therein in such a manner that the ends of the pivot pin engage adjusting devices carried by the lugs integral with the annular metallic member carried by said hard rubber back. My invention is also differentiated from the constructions seen in the British patents to Cahit, No. 14179, granted July 11th, 1901, and Cahit, No. 17,932, granted October 9, 1900, since in my device I employ a thickened hard rubber back, having a rearwardly extending metallic neck, which is secured to and carried by said hard rubber

back, in combination with an annular metallic member having integral forwardly projecting lugs carrying adjusting devices for a pivot pin staked in the outer end of my stylus bar, which construction is not present in said Cahit patents, which are only adapted for playing a hill and dale record, and to none of the devices of the prior art do I herein make my claim.

As a result of numerous and continued experiments I have found that the desired results cannot be obtained if simply a thin disk or shell of rubber is employed at the back of the diaphragm as the sympathetic tones of the metal parts are not properly absorbed and the weight of the sound box is insufficient to cause it to follow at all times the impression groove of the record. In accordance with my present invention, I employ a body of rubber of sufficient thickness to absorb the sympathetic tones of the metal parts and to increase the weight I preferably employ metal or its equivalent which is incorporated with the other component parts in such manner that the necessary effective weight is given to the sound box and the metallic tones are absorbed.

It will now be apparent that I have devised a novel and useful construction of a sound box for talking machines which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description, and while I have, in the present instance, shown and described a preferred embodiment thereof which will be found in practice to give satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit or scope of the invention or sacrificing any of its advantages.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a sound box, a hard rubber body, a metallic ring operatively connected with it, a diaphragm resiliently mounted within and surrounded by said metallic ring, and a stylus bar operatively connected with the diaphragm and pivotally carried by the sound box.

2. In a sound box, a hard rubber body, an annular metallic member operatively connected with it and provided with an inwardly directed lip, a diaphragm resiliently mounted between said lip and said body, and a stylus bar operatively connected with said diaphragm and pivotally carried by the sound box.

3. In a sound box, a hard rubber body, an annular metallic member operatively connected with it, a diaphragm positioned between said rubber body and said member, a gasket between said diaphragm and member, a gasket between said diaphragm and

said rubber body, and a stylus bar operatively connected with said diaphragm and pivotally carried by the sound box.

4. In a sound box, a hard rubber back, a
5 metallic annular member carried thereby,
lugs projecting from said member, a diaphragm resiliently mounted between the
rubber back and member, a stylus bar having its inner end secured to said diaphragm,
10 a pivot pin mounted in the outer portion of
said bar, and adjustable bearings mounted
in said lugs and engaging and supporting
said pivot pin.

5. In a sound box, a hard rubber back, a
15 metallic rearwardly extending flanged neck
carried by said back, a forwardly projecting inwardly turned annular metallic member or lip secured to and also carried by
said hard rubber back, lugs integral with
20 said metallic lip member and projecting
therefrom, a pair of annular gaskets retained between said lip and said hard rubber back, a diaphragm retained between said
gaskets, a stylus bar having its inner end secured to said diaphragm, and pivotal con-

nections common to the outer portion of said stylus bar and said integral lugs.

6. In a sound box, a hard rubber back, a metallic rearwardly extending flanged neck carried by said back, a forwardly projecting inwardly turned annular metallic member or lip secured to and also carried by
by said hard rubber back, and having an inner annular concavity therein, an annular recess
in said hard rubber back in alinement with
35 said concavity, annular gaskets located in
said concavity and said recess, a diaphragm
mounted between said gaskets, lugs integral
with said annular metallic member and projecting forwardly therefrom, a stylus bar
40 having its inner end secured to said diaphragm, a pivot pin carried by the outer end of said stylus bar, and adjustable bearings in said lugs, said bearings being engaged by said pivot pin.

ALVA D. JONES.

Witnesses:

E. HAYWARD FAIRBANKS,
H. S. FAIRBANKS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

(Ordinary)

GRAPHOPHONE PATENT. 1,193,242.

PHONOGRAPH,

#1,193,242-----P. B. Delany,
Patented-Aug. 1st, 1916.
Filed-Sept. 12th, 1912.

P. B. DELANY.
 PHONOGRAPH.
 APPLICATION FILED SEPT. 12, 1912.

1,193,242.

Patented Aug. 1, 1916.

Fig. 3.

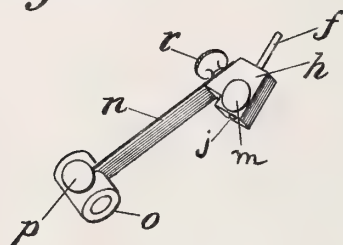


Fig. 1.

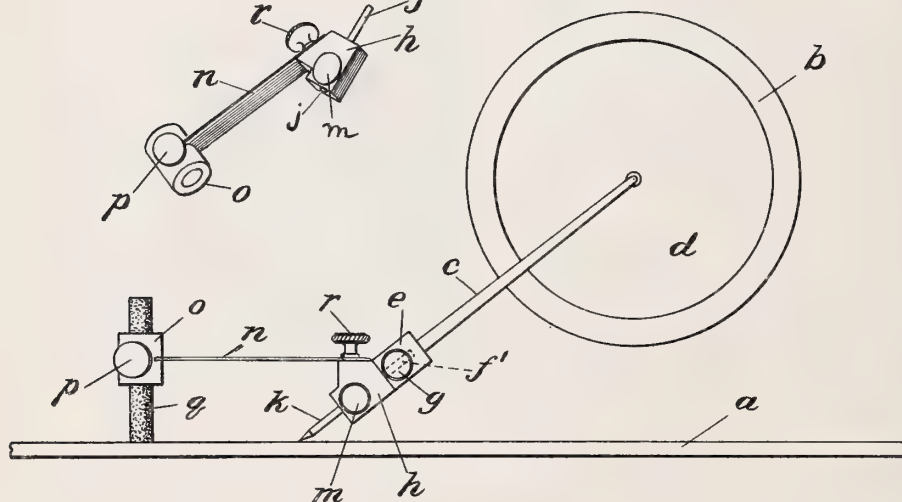
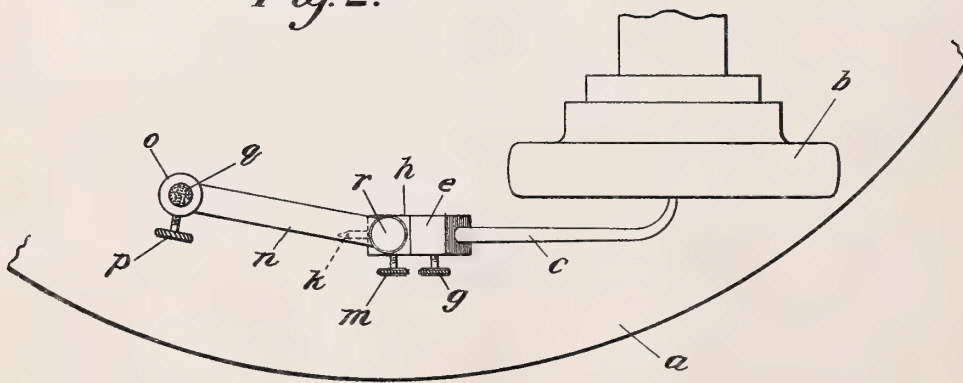


Fig. 2.



Witnesses:
John Darby
L. F. Browning

Patrick B. Delany Inventor
 By *Lucas C. Conney*
Edward C. Davidson

UNITED STATES PATENT OFFICE.

PATRICK B. DELANY, OF NANTUCKET, MASSACHUSETTS.

PHONOGRAPH.

1,193,242.

Specification of Letters Patent.

Patented Aug. 1, 1916.

Application filed September 12, 1912. Serial No. 719,909.

To all whom it may concern:

Be it known that I, PATRICK B. DELANY, a citizen of the United States, residing at Nantucket, county of Nantucket, State of Massachusetts, have invented an Improvement in Phonographs, of which the following is a specification.

My invention relates to treatment of the surface of records for their protection and improvement when new and their improvement when old and worn. For this purpose I coat the record with graphite.

The records, whether disk, cylindrical, or of other formation may be coated with graphite in any appropriate way. The best results may be obtained with pure graphite. When graphite, in the form of a stick or block is used to coat the record, it is preferable that the stick be composed of pure

graphite plus the feasible minimum of binding material. The block or stick of graphite, held in a suitable support so that it will bear upon the surface of the record that is revolving with the table or support of an ordinary reproducing machine, acts to coat the surface, and the reproducing needle running in the channels or grooves of the record acts as a distributor of the graphite that brings it into intimate relation with

the surfaces of said grooves. It is well known that graphite is an efficient lubricant and that its lubricating qualities depend upon its capability of attenuated distribution and filling the pores of surfaces to which it is applied. These characteristics afford very markedly improved results in the reproduction of musical tones and spoken words from a graphite coated record.

Even the needle, whether it be of steel or other composition, becomes surface coated and filled with the graphite. The general result is that there is a reduction of friction, and a characteristic smoothness of contact between the surfaces of the needle and

record that causes objectionable sounds ordinarily present to be eliminated. Experience has demonstrated that in addition to the advantages above suggested static electrical effects due to frictional contact of the needle and record are eliminated or dissipated where the record is coated with graphite which is a fair conductor of electricity.

Furthermore, there is less likelihood of dust or floating particles of any kind adhering to the graphite coated record than there is in the case of the ordinary uncoated record.

The surface of the record being covered with graphite is divested of its electro-static capacity for the reason that the graphite instead of being an insulator is a conductor and therefore does not attract floating particles or hold them when lodged by gravitation. Rubber, sealing wax or glass when rubbed with dry fabric will hold a static charge, but if any of them be coated with a conducting material their static capacity is dissipated.

The graphite may be applied to new or old records by placing the record in a reproducing machine and revolving the disk in contact with a stick or block of graphite held in the hand or mounted upon an arm carried by the needle head which arm may be resilient so as to press the block yieldingly against the record.

The accompanying drawing shows a practical and highly efficient way of applying graphite to a disk record.

Figure 1 is a diagrammatic side elevation; Fig. 2 a similar plan view; and Fig. 3 a perspective view of the graphite applying attachment separated from the reproducer arm.

An ordinary disk record is indicated by *a*, the reproducer by *b*. The reproducer arm *c* is to be supported in any known or suitable way. At one end it is attached to the reproducer diaphragm *d*, and at the other is equipped with an ordinary needle head or holder *e*, the needle receiving slot *f* Fig. 1 being indicated by dotted lines. The needle clamping screw is marked *g*.

The attachment by which graphite may be applied to the record is constructed as follows: It has a body or head-block *h* in one end of which is fixed a pin *f* that enters the needle slot of the reproducer arm and is clamped therein. In the other end of the block, and in line with the pin *f*, is a recess *j* adapted to receive an ordinary reproducer needle *k* held therein by a clamp screw *m*. At the top block *h* has a flat face to which is adjustably attached a laterally or horizontally projecting plate spring *n* that carries at its free end a graphite holder *o* having a vertical bore and a clamp screw *p*. In the holder is adjustably clamped a rod or pencil of graphite *q*. Vertical adjustment of the graphite rod varies the tension imposed on spring *n* and so regulates pressure of the rod upon the grooved surface of the record. The spring *n* may be adjusted, by

turning it about its clamping screw *r*, so that the graphite rod may be caused to bear upon the record in desired relation to the path of the needle *k*. Preferably the graphite rod is 5 caused to bear on the record somewhat inside of the needle, that is nearer to the axis of the disk.

The graphite rod is of such thickness or diameter as to cover a number of the grooves 10 of the record, and as the latter revolves fine particles are ground from the rod and deposited in the grooves. The needle following in such grooves as they come around distributes the graphite therein and rubs it 15 into the operating surfaces thereof.

I claim:

1. An attachment for applying graphite or other appropriate solid lubricant to a record, comprising a head adapted to be 20 held by the usual reproducer needle holder and having means for receiving and holding a needle adapted to run in the grooves of the record in combination with a spring supported holder connected to said head adapted 25 to carry a block or rod of solid lubricant in contact with the record.

2. In a talking machine, the combination of a finished revolving record, a reproducing needle, and means controlled by said machine for distribution of a lubricant on 30 the record in the path of the needle whereby said needle will rub the lubricant into intimate contact with the record lines or grooves as the latter traverses the record.

3. In a talking machine, the combination 35 with the reproducing arm, a needle holder carried thereby, a piece of solid lubricant, and means for yieldingly supporting it on the needle holder.

4. In a talking machine the combination 40 with the reproducer arm, of a spring pivotally connected therewith to move about a vertical axis, means for holding the spring in its adjusted position, and a lubricant holder carried by said spring and which 45 presses the lubricant against the record.

In testimony whereof, I have hereunto subscribed my name.

PATRICK B. DELANY.

Witnesses:

ANNIE P. RITENOUR,
JANIE P. CAUNTO.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

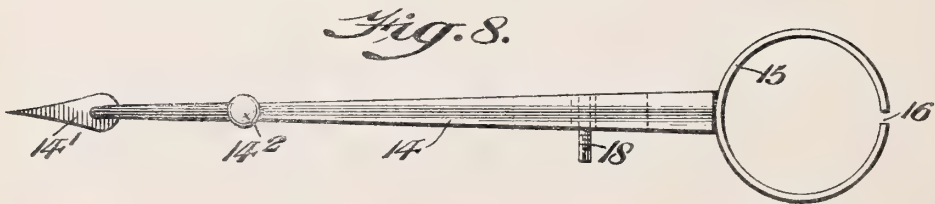
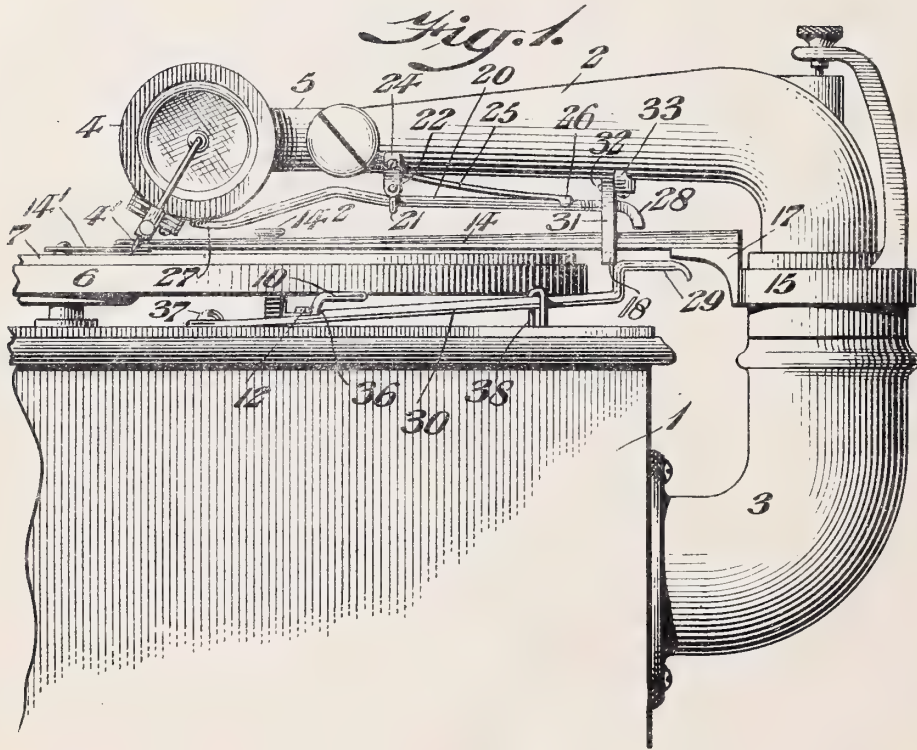
AUTOMATIC STOP MECHANISM FOR TALKING MACHINES

1,193,266 -----Stanley R. Howard,
Patent Aug. 1, 1916.
Filed Mar. 2, 1916.

S. R. HOWARD.
 AUTOMATIC STOP MECHANISM FOR TALKING MACHINES.
 APPLICATION FILED MAR. 2, 1916.

1,193,266.

Patented Aug. 1, 1916.
 3 SHEETS—SHEET 1.



WITNESSES

H. E. Dieterich
L. Douville

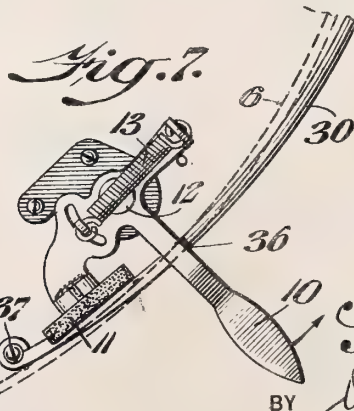
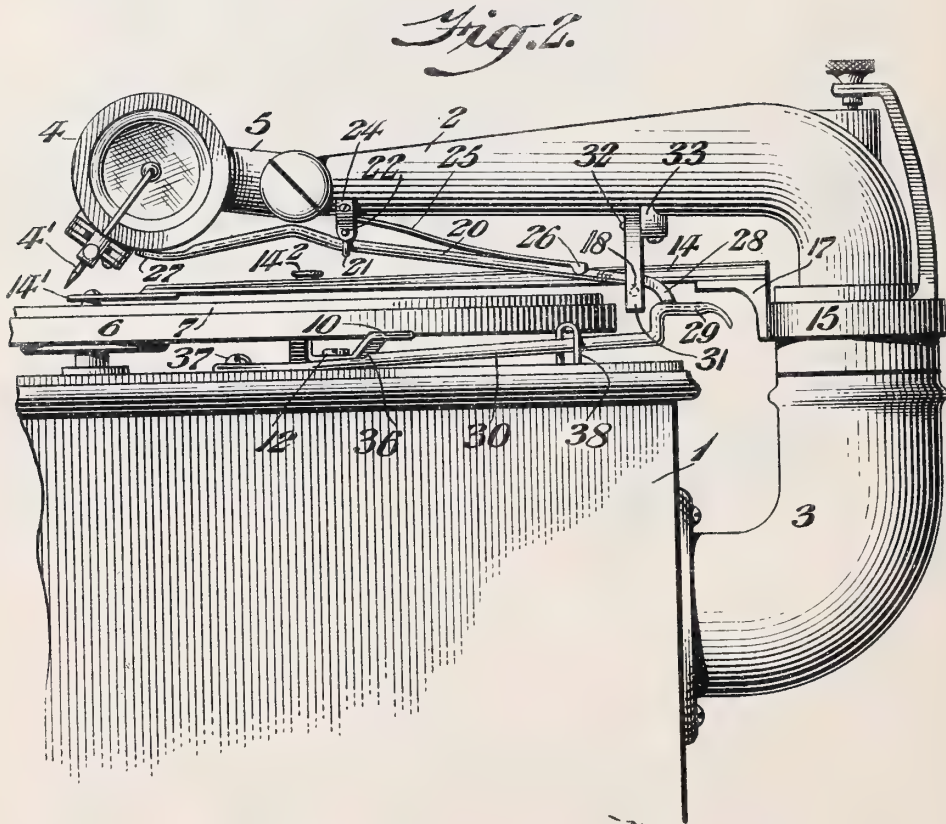
INVENTOR

Stanley P. Howard
 BY *Dieterich & Fairbank*
 ATTORNEYS

S. R. HOWARD.
 AUTOMATIC STOP MECHANISM FOR TALKING MACHINES.
 APPLICATION FILED MAR. 2, 1916.

1,193,266.

Patented Aug. 1, 1916.
 3 SHEETS—SHEET 2.



WITNESSES

H. P. Dietrich
L. Bouville

BY

INVENTOR
Stanley R. Howard
Wiederstein & Fairbanks
 ATTORNEYS

S. R. HOWARD.
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1,193,266.

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 3 SHEETS—SHEET 3.

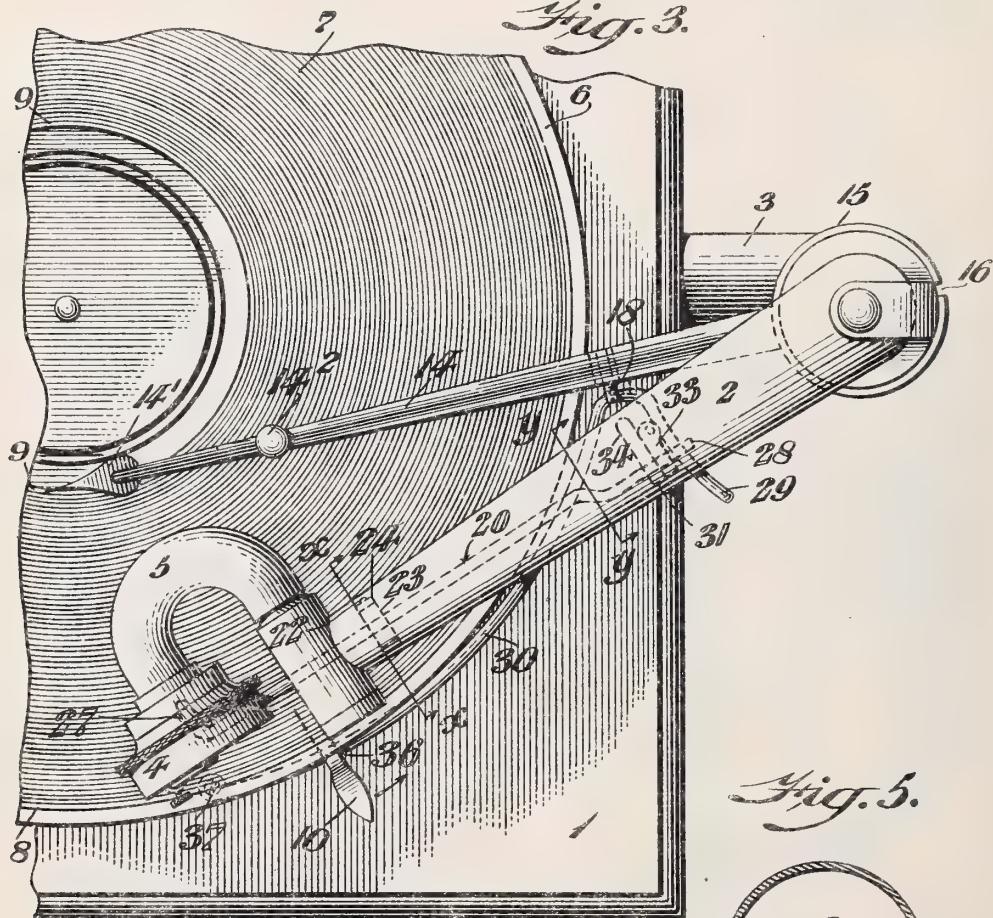


Fig. 4.

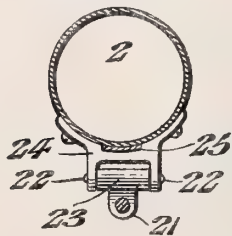
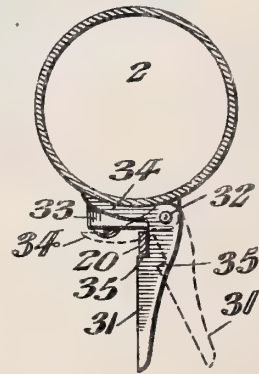


Fig. 6.



Fig. 5.



WITNESSES

H. E. Richterich
L. Houville

INVENTOR

Stanley R. Howard
Wiederstein & Fairbank S.

BY

ATTORNEYS

UNITED STATES PATENT OFFICE.

STANLEY R. HOWARD, OF PHILADELPHIA, PENNSYLVANIA.

AUTOMATIC STOP MECHANISM FOR TALKING-MACHINES.

1,193,266.

Specification of Letters Patent.

Patented Aug. 1, 1916.

Application filed March 2, 1916. Serial No. 81,676.

To all whom it may concern:

Be it known that I, STANLEY R. HOWARD, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Automatic Stop Mechanism for Talking-Machines, of which the following is a specification.

My invention relates to the general art of talking machines and more particularly to that class of such machines as are equipped with means for both automatically lifting the needle and stopping the rotation of the record table when the record has been played.

Commercial records of certain types are provided near their centers with a circular groove known as a stop groove into which the last convolution of the tone grooves enters and vanishes. The function of this groove is to form an indicator into which the needle, before the swinging of the tone arm into position for the needle to engage with the outermost tone groove, is first manually dropped and while in the groove availed of to make possible the adjustment of a lever stop device for the table, the lever of which will be encountered by a depending stop arm on the tone arm when the tone arm has completed its swing and the needle completed its traverse of the record.

Many devices have been contrived to automatically lift the needle from the record when it has reached the stop groove but all of them possess disadvantages which it is the object of my invention to overcome, and among which may be mentioned the tendency of the needle to scratch the groove, the difficulty of its initial adjustment with reference to the groove, the uncertainty of uniform performance, and the complexity of the construction.

The object of my invention, generally considered, is to provide a simple, inexpensive and effective means for easily and quickly occasioning both the lifting of the needle and the stopping of the table, by the use of which the possibility of injuring the record by the accidental movement of the needle radially outward across its tone grooves when first being set down into the stop groove, and the necessity of causing the needle to touch the record until it is placed in position to begin playing, are both avoided.

Having this and other objects in view, my invention comprehends means entirely independent of the needle or record table, for so adjusting the machine that the desired lifting of the needle can be effected, and at the same time the stoppage of the table at the desired point be secured.

For the purpose of illustrating my invention, I have shown in the accompanying drawings a certain type and embodiment of it which is at present preferred by me because in practice it has given satisfactory and reliable results. It is to be understood, however, that the various instrumentalities of which my invention is embodied can be variously arranged and organized and that my invention is not therefore limited to the precise arrangement and organization of these instrumentalities which are typified in the constructions illustrated in the accompanying drawings and hereinafter described.

In the drawings:—Figure 1 represents in side elevation a portion of the casing of a talking machine, the tone arm, and its extension to the amplifier, and the devices which my invention comprehends, the parts being shown in the position which they occupy just before the commencement of the playing. Fig. 2 represents a view similar to Fig. 1, the parts, however, being represented in the position which they occupy when the playing has been completed, the needle lifted and the table stopped. Fig. 3 represents a plan view of the index arm and finger in the position to occasion the lifting of the needle and the stoppage of the table when the needle has completed its traverse and reached the point of its desired stopping,—the sound box and needle being shown in the position they occupy when they have been set for the starting of the playing. Fig. 4 represents a transverse section through the tone arm on the dotted line $x-x$ of Fig. 3, sight being taken in the direction of the arrows upon said line. Fig. 5 represents a transverse section through the tone arm on the line $y-y$ of Fig. 3, sight being taken in the direction of the arrows upon said line. Fig. 6 is a detail of the adjustable trigger stop. Fig. 7 is a plan detail of the stopping and starting lever and the brake, of the type used, for instance, on the Victor machine. Fig. 8 represents a plan view of the index arm and finger re-

moved from the machine. Fig. 9 represents a top plan view of the lifting lever of the sound box and needle.

Similar numerals of reference indicate corresponding parts.

Referring to the drawings:—1 designates so much of the casing of a talking machine as is necessary to illustrate my invention.

2 is the tone arm of any usual type, 3 the amplifier extension upon which the tone arm swings, 4 the sound box swiveled on a goose neck 5 in the usual manner.

6 designates the record carrying table, 7 a record upon it, 8 the outermost tone groove, and 9 the stop groove of the record.

10 is the stopping and starting lever of the brake block 11, swiveling upon a pivot pin 12 and controlled by a spring 13. The operation of this device which acts upon the inner face of the downwardly extending internal peripheral flange of the table being generally understood, requires no further explanation.

14 designates my index arm and finger, 14', which is clamped upon the tone arm by a spring clamping collar 15 having an opening 16. The connection between the collar and the arm is conveniently in the form of a connecting bracket 17.

14² is a handle for manipulating the index arm. The index arm and its finger, as will be understood, is therefore capable, against the clamping resistance of the clamping collar, of being swung horizontally referably to the swinging axis of the tone arm as its own axis.

18 is what I term a trigger stop, extending laterally from the index arm and being conveniently threaded so as to fit within a threaded socket 19 integral with or attached to the index arm.

20 is what I term a lifting lever pivoted beneath its tone arm and extending beneath its outer end. A good form of trunnion or pivot connection between the lever and the arm is shown in Fig. 4, and consists of a depending lug 21 connected with a trunnion 23, the pivots of which are designated 22 and fit within an armed bracket 24 integral with or attached to the tone arm. Obviously, the lifting lever is capable of rocking upon its pivots beneath the tone arm.

25 is a spring for the lifting lever, affixed to the tone arm conveniently by having its outer end clamped to it by the bracket 24. The spring extends rearwardly of its attachment to the tone arm in parallelism with but above that inner portion of the lifting lever which extends to the rear of its pivot, and to insure the free end of the spring from slipping off the lever which it tends normally to hold down, it is provided with a pair of clips 26 which extend over both sides of the lifting lever. The outer end of the lifting lever extends beyond its

pivot to beneath the vertical center of the sound box when turned over and forwardly for action, and is preferably inturned to form a thumb piece 27 which sub-serves the two functions, first, of permitting of the manual depression of the lever against the resistance of its spring so as to effect the engagement of its then uplifted rear end with the trigger 31, as hereinafter explained, and second, of forming a contact surface beneath the periphery of the sound box to permit of its lifting the sound box and its needle referably to the rotary axis of the goose neck in its connection with the tone arm, when the record has been played and the trigger tripped. The inner end of the lifting lever is turned downwardly to form what I term a heel 28, which, in certain positions of the parts, in the dropping down of the lever when released from the trigger encounters what I term a stop segment 29 extending from and inturned at the inner end of what I term the auxiliary brake lever 30, as later explained.

31 is what I term a trigger, depending from the tone arm at a point between its swinging axis and the outer circumference of the record table. This trigger is of the gravity type and preferably of the form indicated in Fig. 5, swings upon a pivot 32 which parallels the horizontal extension of the tone arm, and is conveniently connected with the tone arm by a block or housing 33 integral with or attached to the under surface of said tone arm. The trigger is not only of the gravity type but may be said to be of bell-crank form, that is to say, it consists of a vertically depending member to which the numeral 31 is applied and of a horizontally extending curved stop member 34, which in the normal gravitatively depending position of the trigger bears against the under surface of the tone arm and forms a stop to prevent the swing of the trigger in more than one direction, that is say in a direction other than to the right hand in Fig. 5. The upper inner vertical side face of the trigger is formed near its upper end and the crotch between it and its curved member, with a notch which I term a lever notch, for engagement with the lifting lever 20, as shown in full lines in Figs. 1 and 5, when said lever in the depression of its outer end and against the resistance of its spring is so lifted as necessarily to engage within it.

Referring again to the auxiliary brake lever 30,—36 is an incline-faced stop shoulder formed on its upper face, which during the running of the table engages against the stopping and starting lever 10. The auxiliary stop lever being a spring lever firmly fastened at its inner end by the screw 37 to the casing, normally serves, after the table has been started, to permit of its running, but when depressed at its free end by the

contact of the heel 28 of the lifting lever 20 which takes place as soon as the trigger stop 18 encounters the depending arm of the trigger 31, also serves to set free the brake lever 10 so that the spring 13 of said lever 10 can act upon it to throw in the brake and stop the table.

38 is a staple within which the auxiliary lever has an up and down movement and which serves to prevent its displacement.

The stop segment is an arc the radius of which centers in the axis of the tone arm, and this shape is adapted for the purpose of assuring the contact of the heel of the lifting lever with said stop segment no matter what the position of the tone arm, the needle and the sound box may be when it is desired to lift the needle and stop the table.

The operation of the device so far as not already described, will be easily understood:—Wherever, within its range of in and out movements, the index arm may be placed at starting, that is whether its finger be over the stop groove of the record or over any one of the tone grooves, the arm by reason of the clamping action of its collar 15 will remain in that position, and of course within a range of movement calculated as not greater than the length of the arc of the stop segment the trigger stop 18 will come to a standstill. Assume the trigger arm placed where desired, the needle inserted, and the sound box thrown backward on the tone arm so as to leave exposed the thumb piece 27 or outer end of the lifting lever.—pressure then manually exerted upon said outer end will overcome the resistance of the spring and raise the inner or heel end of the lever up to a point where it passes the notch of the trigger and so permits of the gravitative inward movement of said trigger and of the consequent engagement of the lever with its notch. After this has been done, the table is started and the sound box thrown over to bring the needle in line with the starting groove and itself in line over the outer end of the lifting lever, as shown in Fig. 1. The starting lever is then thrown to the left in Fig. 7, and clears the notch on the outer free portion of the auxiliary lever and so permits said auxiliary lever under its own resilience to spring up at its outer end as far as the staple will permit, and until the stop segment is raised to a height within reach of the drop of the heel of the lifting lever, where, in the swinging in of the tone arm, the depending portion of the trigger will encounter the trigger stop,—which in the then position of the index arm is standing still,—and so will occasion the tripping of the trigger and the release of the lifting lever, which, under the throw of its spring, will cause the heel to encounter and come to rest upon the stop segment and at the same time cause the outer end of said lifting lever

to strike and lift the sound box to a height sufficient to free the needle from the record.

In practice I find that a gravity trigger is simpler and more inexpensive than a spring-controlled trigger would be, but I do not wish to confine myself to a gravity trigger, as any trigger device adapted to engage the inner end of the lifting lever would be its mechanical equivalent. Similarly, while a notch of the form shown is better than a pin or other equivalent stop on the trigger would be, I do not confine myself to such a notch. Similarly, again, while I prefer to provide the lifting lever with a thumb piece at its outer end and with a heel at its inner end, neither feature is of the essence of the lifting lever as such. Similarly, further, the trigger stop and the index arm although convenient, are not essential, as the index arm itself, or any protrusion from it, will, as will be evident, make contact with the trigger and cause it to be tripped. Similarly, still further, while I prefer to form my auxiliary lever of a piece of spring wire bent essentially into the form shown in the drawings, I do not confine myself to wire, and so far as the stop segment portion of said auxiliary lever is concerned, I do not confine myself to its being of the arc shape shown, as it will be obvious that so long as it is wide enough along its upper face to encounter either the heel of the lifting lever when dropped, no matter what the position of the index arm may be, or to encounter the inner end of the lifting lever even should it not be provided with a down-turned heel, it will subserve my purpose of stopping the downward movement of the lifting lever at the time when it is desired to stop it.

It will now be apparent that I have devised a novel and useful automatic stop mechanism for talking machines which embodies the features of advantage enumerated as desirable, and that while I have in the present instance, shown and described a preferred embodiment of it which has in practice been found to give satisfactory and reliable results, it is to be understood that the embodiment is susceptible of modification in various particulars, without departing from the spirit or scope of the invention or sacrificing any of its advantages.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A machine of the class recited, which comprises in combination;—a rotatable record table adapted to carry a record;—a device for stopping and starting said table;—a stopping and starting lever for operating said device;—a swinging tone arm;—a spring-controlled lifting lever pivoted to said tone arm, the outer end of which extends beneath the sound box when

in place for playing, and the inner end of which extends toward the swinging axis of the tone arm;—an index arm above the table and record which has a swinging movement above the record upon an axis co-incident with that of the tone arm;—a
 5 notched trigger carried by the tone arm adapted to engage the inner end of the lifting lever when said inner end is lifted;—
 10 and a resilient auxiliary lever fixed at its inner end, provided with a shoulder adapted to engage the stopping and starting lever, and at its outer end provided with a stop surface which lies beneath the inner
 15 end of the lifting lever.

2. A machine of the class recited, which comprises in combination:—a rotatable record table adapted to carry a record;—a device for stopping and starting said table;—a stopping and starting lever for operating said device;—a swinging tone arm;—a spring-controlled lifting lever pivoted to said tone arm, the outer end of which extends beneath the rim of the sound box
 25 when in place for playing, and the inner end of which extends toward the swinging axis

of the tone-arm;—an index arm above the table and record which has a swinging movement above the record upon an axis co-incident with that of the tone arm;—a
 30 notched trigger carried by and depending from the tone arm, adapted to engage and hold up the inner end of the lifting lever when the outer end of said lever is depressed to cause such engagement, and which in the
 35 swing of the tone arm will encounter the index arm so as to be tripped by it and so effect the release from engagement of the lifting lever;—and a resilient auxiliary lever fixed at its inner end, provided with a
 40 shoulder adapted to engage the stopping and starting lever, and at its outer end provided with a segmental stop surface which lies beneath the inner end of the lifting
 45 lever.

In testimony whereof I have hereunto signed my name this first day of March, 1916.

STANLEY R. HOWARD.

In the presence of—

J. BARSALL TAYLOR,
 C. D. McVAY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH CONTROLLING DEVICE,
#1,193,350-----B. B. Blood,
Patented-August 1st, 1916.
Filed-April 16th, 1913.
Renewed-October 9th, 1915.

B. B. BLOOD.
 PHONOGRAPH CONTROLLING DEVICE.
 APPLICATION FILED APR. 16, 1913. RENEWED OCT. 9, 1915.

1,193,350.

Patented Aug. 1, 1916.

3 SHEETS—SHEET 1.

Fig. 1

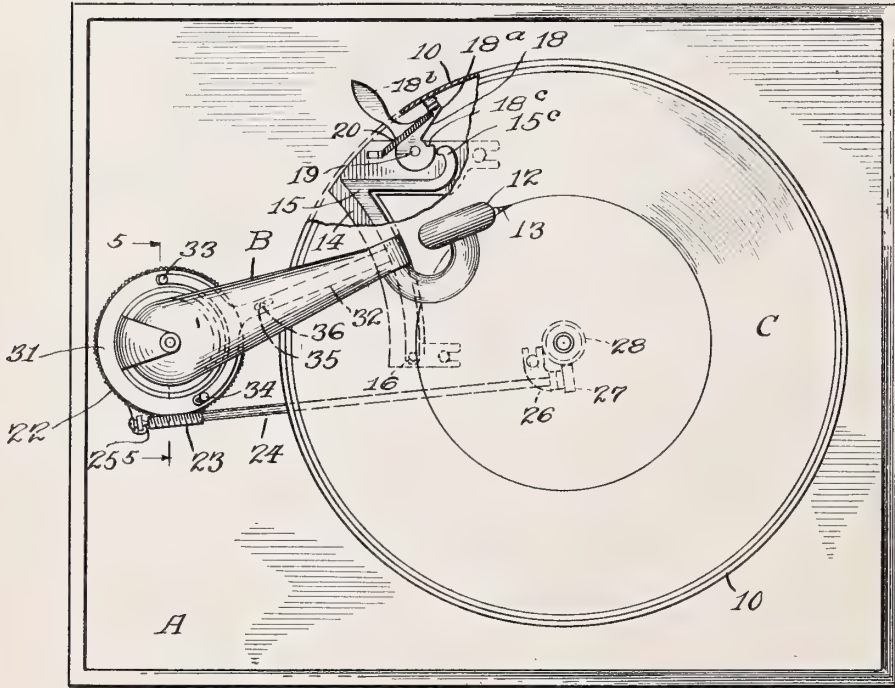
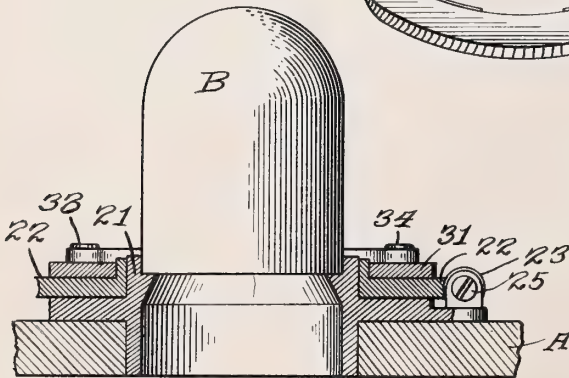


Fig. 5



Witnesses:
 L. B. Graham
 R. C. Wighton

By

Inventor:
 Burr B. Blood,
 Heidemau Street.

Att'y's

B. B. BLOOD.

PHONOGRAPH CONTROLLING DEVICE.

APPLICATION FILED APR. 16, 1913. RENEWED OCT. 9, 1915.

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Patented Aug. 1, 1916.

3 SHEETS—SHEET 2.

Fig 2.

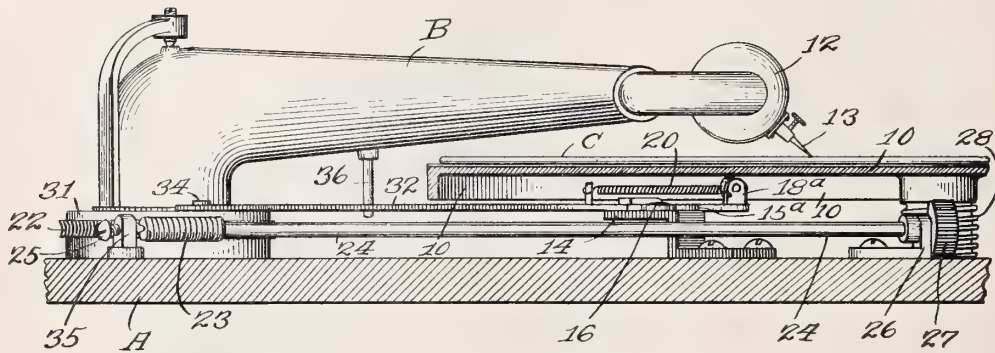


Fig 3

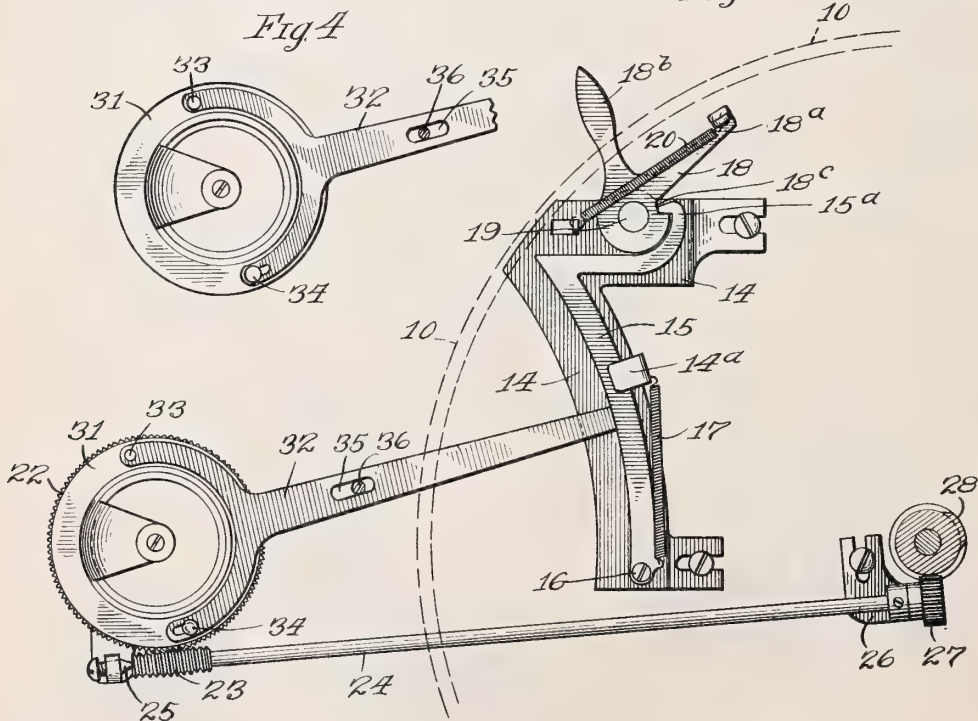
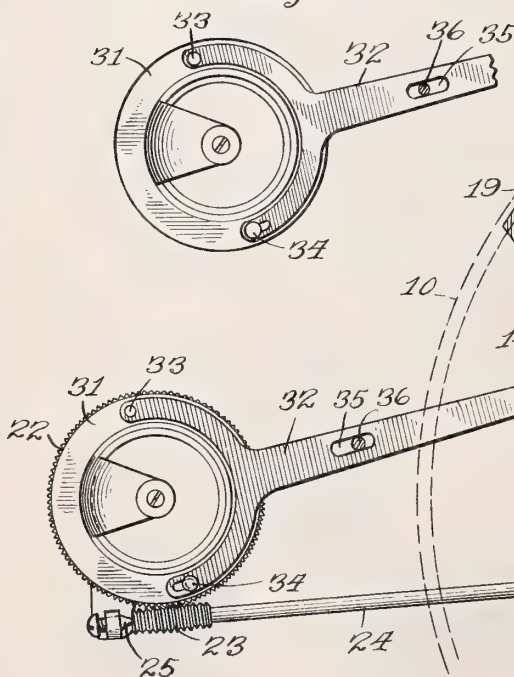


Fig 4



Witnesses:
L. B. Graham
A. E. Wighton

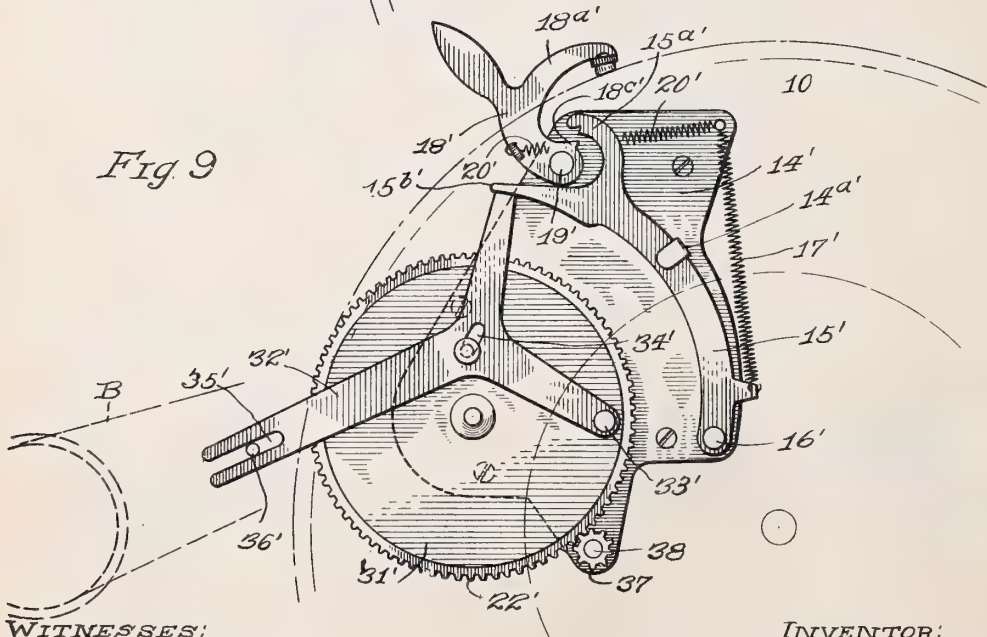
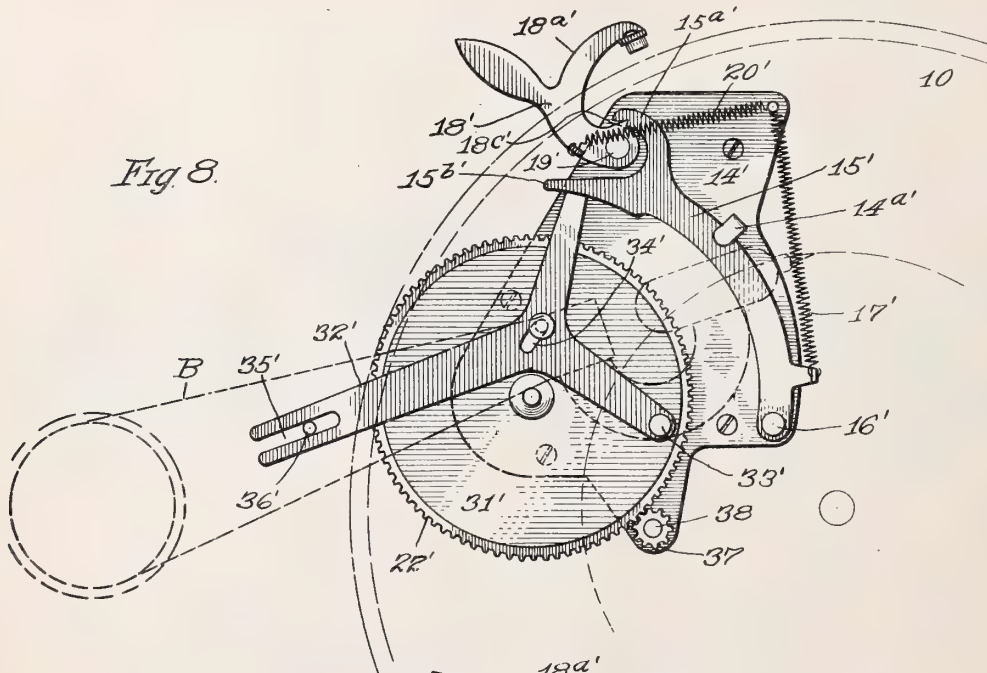
Inventor:
Burr B. Blood
By
Heidman Street

Atty's

B. B. BLOOD.
 PHONOGRAPH CONTROLLING DEVICE.
 APPLICATION FILED APR. 16, 1913. RENEWED OCT. 9, 1915.

1,193,350

Patented Aug. 1, 1916.
 3 SHEETS—SHEET 3.



WITNESSES:

L. B. Graham
 A. E. Wighton

INVENTOR:

By Burr B. Blood,
 Heideman Street
 Att'ys.

UNITED STATES PATENT OFFICE.

BURR B. BLOOD, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE RAJAH COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

PHONOGRAPH-CONTROLLING DEVICE.

1,193,350.

Specification of Letters Patent.

Patented Aug. 1, 1916.

Application filed April 16, 1913, Serial No. 761,581. Renewed October 9, 1915. Serial No. 55,110.

To all whom it may concern:

Be it known that I, BURR B. BLOOD, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Phonograph-Controlling Devices, of which the following is a description, reference being had to the accompanying drawings, which form a part of my specification.

My invention is more especially intended for use in connection with phonographs employing disk records, and has for its object the provision of means whereby the operation of the motor of the phonograph, and, therefore, the rotation of the record-carrying member or table, will be automatically controlled at the predetermined or proper moment, whereby the useless operation of the motor after the record has been reproduced or completed will be prevented, until the usual motor stopping mechanism, with which phonographs are generally provided, can be operated.

The object of my invention is the provision of a device which may be readily adjusted to different sized records or machines; the device being such that when the stylus or needle of the reproducer reaches the innermost circle, in other words, the end of the record, it will be moved into "braking" position and the record-carrying member or turn-table automatically held against rotation.

A further object of the invention is the provision of a device which will be controlled by the reproducer arm, so that additional adjusting or "setting" of the controlling device is made unnecessary, as will be more fully understood from the following detailed description.

In the drawings:—Figure 1 is a plan view of a phonograph provided with my improved controlling device; a portion of the record disk and record-disk-carrying member or turn-table being broken away in order to more clearly show the brake portion of the device beneath. Fig. 2 is a partial sectional and partial side elevation of a portion of the upper part of the phonograph with my improved device as illustrated in Fig. 1. Fig. 3 is a top plan view of my improved device secured in place as shown in Fig. 2, with the reproducer arm removed, and a portion of the turn-table

shown in dotted lines, while the box-top or cabinet is omitted. Fig. 4 is a detail plan view of a portion of the controlling device as shown in Fig. 3, namely the collar and lever portion which encircle the base of the reproducer arm. Fig. 5 is a sectional view taken on the line 5—5 of Fig. 1, looking in the direction of the arrows. Fig. 6 is a detail sectional view illustrating the portion of the device which engages with the turntable hub or with the operating shaft. Fig. 7 is a detail perspective view of a modified form of frictional split collar, adapted to surround the base of the reproducer arm. Fig. 8 is a top plan view of a modified form of my device wherein substantially the entire mechanism is located beneath the turntable; the reproducer and a portion of the turn-table being shown in dotted lines with the box top or cabinet omitted. Fig. 9 is a similar view to Fig. 8 with the mechanism shown in tripped or braking position.

As my invention has nothing to do with the construction of the phonograph or of the motor, a description thereof need not be entered into; the cabinet or member A being of the usual construction and provided with the usual operating motor whereby the record-carrying member or turn-table 10 is rotated by means of the spindle or shaft 11.

As an exemplification of my invention, I illustrate the same applied to a phonograph provided with the usual hollow reproducer arm B, which is mounted so as to oscillate horizontally; the outer end of the arm being provided with the usual reproducer 12, having the usual stylus or needle 13. In phonographs of the type illustrated, the hollow arm B with the reproducer 12, is so mounted as to permit it to move in the arc of a horizontally disposed circle, that is from the outer circumference or groove of the record-disk or plate C toward the inner circumference or groove thereof.

Secured beneath the record carrying member or turn-table 10, and at a suitable point in proximity to the periphery of the turntable and preferably on top of the cabinet A of the phonograph, I provide a plate or supporting member 14, to which is pivotally secured an arcuated member 15. The member 15 is preferably pivotally secured at its one end, as at the point 16, to the plate 14. The member 15 is curved in the arc of a circle identical with that described by the

reproducer arm B, and the free end is provided with a hook-portion 15^a. The hook member 15 is controlled by a coil spring 17, one end whereof is secured to a lug 14^a secured to plate 14, and which is also arranged to overlap the member 15 so as to prevent any upward movement of member 15. The tendency of the spring 17 is to force the hook portion of the member 15 toward the brake-member now to be described.

Pivottally mounted on the plate 14 and in proximity to the hook portion of member 15 is a brake-member 18, pivoted at the point 19. The member 18 is pronged or bifurcated as clearly shown in Fig. 3; the one prong or bifurcation 18^a constituting the brake applying portion, while the other prong or bifurcation 18^b is the hand engaging or adjusting portion. The central or hub portion of member 18 is provided with a shoulder or notch as shown at 18^c which is adapted to be engaged by the hook portion of member 15 when the device is adjusted or out of "braking" position. In the exemplification of my invention as shown in the drawings, the brake member 18 is controlled by a coil spring 20, one end whereof is secured to the free end of the prong or bifurcation 18^a while the other end is secured to a lug on the plate 14. It is clearly evident from the construction shown that the spring 20 tends to move member 18 about its pivot and draw the prong or bifurcation 18^a toward the outer periphery or flanged circumference of the record carrying table or member 10, which is shown in dotted lines in Fig. 3.

Surrounding the hub portion of the collar or member 21 which receives the base of the reproducer arm B, see Fig. 5, I provide a gear 22, which is arranged to mesh with a worm 23 secured at the end of a shaft 24. The ends of shaft 24 are provided with suitable bearings, as for example a pivotal or pin and socket bearing shown at 25, and the support or standard 26. The support for the pivot or pin bearing 25 may be secured to the flange or rim of the member 21, or to the cabinet of the phonograph, as clearly shown in the drawings. The bearing or support 26 for the opposite end of shaft 24 is shown secured to the box or cabinet of the phonograph at a point in proximity to the spindle or shaft 11. The end of the shaft 24 in proximity to the spindle or shaft 11, or rather in proximity to the hub of the turn-table 10, is provided with a suitable gear 27, which is adapted to mesh with a worm gear 28 secured either to the shaft 11 or to the hub of the turn-table or plate 10. In the specific construction shown in the drawings, the worm 28 is shown formed integral with the hub of the turn-table 10; it will be understood, however, that the

worm 28 may be formed separately in the nature of a ferrule or sleeve, which may be slipped onto the hub of the turn-table 10 or the shaft 11, so as to rotate therewith. The worm hub 28 is shown provided with a socket as at 29 to receive the cross pin 30 whereby a positive engagement with the shaft 11 is formed.

It is evident from the construction just described that as the shaft 11 is rotated by the motor of the phonograph, the member 10 together with the worm hub 28 will also be rotated, which in turn will rotate the gear 27, rotating shaft 24, and thereby rotate worm 23, secured at the other end of the shaft 24, which meshes with gear wheel 22.

Mounted on the horizontally disposed gear wheel 22 and in frictional engagement therewith, is an annular plate or member 31. The member 31 is preferably arranged to fit about the vertical flange on gear wheel 22, as more clearly shown in Fig. 5. A modified form as shown at 31^a, see Fig. 7, may be employed; the member being provided with a split vertically extending flange 31^b adapted to engage with and firmly clamp the flange or shoulder on gear 22.

Secured to member 31 is a bifurcated arm or lever 32; the free end of the arm or lever 32 being in sliding contact with the hook member 15 as clearly shown in Fig. 3. The bifurcated lever 32 is pivoted at the point 33 to the member 31; while the other bifurcated portion of lever 32 has a slot and pin connection as shown at 34 with the member 31 so as to allow this end of the lever to have slight movement in a manner tangentially to the periphery of member 31. At a point intermediate of its ends, the lever 32 is provided with a suitable slot as shown at 35, Fig. 3, which receives a guide-pin 36 secured to the reproducer arm B, see Fig. 2. It is evident from the construction just described, that the lever or arm 32 must move with the reproducer arm B, transversely of the record.

In order that the hook member 15 may occupy the same horizontal plane as the free end of lever 32, and also provide a support for the free end of lever 32, I prefer to form the plate 14 in the manner more clearly shown in Fig. 2, that is, with the main or body portion thereof bent upward and occupying a plane above the portion which receives the attaching screws whereby the plate is secured to the phonograph cabinet.

In its application, the plate 14 is secured on the phonograph cabinet or top beneath the turn-table so as to bring the brake-member 18 into close proximity to the depending flange at the periphery of the turn-table, as more clearly shown in Fig. 3; and the shaft 24 is adjusted so that the gear 27 will mesh

with worm 28 of the turn-table 10, with worm 23 in mesh with gear 22; brake-member 18 is then swung about its pivotal point 19 out of "braking" position, so as to bring the notch 18^a at a point where it may be engaged by the hook of the member 15; the latter being held in constant frictional engagement with member 18 by the action of spring 17, while the spring 20 will hold the brake-member 18 under tension so as to move it into engagement with the flange or rim of the turn-table as soon as member 18 is released by hook-member 15.

After the record-disk has been put into place, the reproducer arm B with the needle 13 is then moved toward the outer circle or groove on the record plate. This movement of the arm B will compel the lever 32, that is the free end thereof, to move in a similar direction, namely toward the hook end of member 15, by reason of the pin 36 which engages in the slot 35 of lever 32. As the motor of the phonograph is set in operation, the shaft 11 will be operated and turn-table 25 or member 10 rotated. The rotation of turn-table 10, with its worm hub 28, will necessarily rotate gear 27 and, therefore, shaft 24, which in turn, by reason of the worm 23, will rotate gear 22; the gearing being such that gear 22, and therefore member 31, will revolve at substantially the same speed as the arm B of the phonograph. The stylus or needle 13 will, of course, compel the reproducer arm B to move from the outer circumference of the record-disk toward the center thereof, until the stylus reaches the innermost groove, when further transverse movement of the reproducer arm B toward the center of the record-plate is prevented. As the motor, and therefore shaft 11, will still continue operating, it is evident that shaft 24 will be rotated and in turn gear 22. The continued rotation of gear 22 and therefore rotary movement of member 31 will tend to move the lever or arm 32 still farther, but by reason of the pin 36 on arm B, movement of lever 32 in a circular direction will be prevented. The force exerted by gear 22 and member 31, while the free end of lever 32 is held against further rotary movement by pin 36, will, therefore, cause lever 32 to move about its pivotal point 33, made possible by the slot connection 34 and 35, and force the lever toward hook-member 15. This movement of the lever 32 and member 15, will release brake-member 18, which, by reason of spring 20, will engage with the rim or flange of turn-table 10 and hold it against further rotation, and therefore also stop operation of shaft 11 and the motor. The brake-end 18^a of member 18 is preferably provided with proper material to induce a good frictional contact with the flange or rim of the turn-table.

In Figs. 8 and 9 I illustrate a modified form of my invention, wherein substantially the entire mechanism is located beneath the turn-table and the tripping lever or mechanism is operated directly from the motor within the cabinet of the phonograph, instead of having the tripping mechanism operable from the turn-table shaft or spindle. In Fig. 8 the mechanism is shown in "set" position with the stylus or needle of the reproducer at the innermost circle of the record disk, the mechanism being shown in position just prior to the tripping action. In Fig. 9, I illustrate this modified form in tripped position, that is, with the braking member in contact with the outer periphery of the turn-table.

In the modification shown in Figs. 8 and 9, I show the plate or supporting member 14' secured to the top of the cabinet of the phonograph at a point intermediate of the turn-table operating spindle or shaft and the outer periphery of the turn-table. In this construction the arcuate member 15' is pivotally secured at its one end in a member similar to that of the construction shown in the previous figures: the free end of the arcuate or hook member 15', however, is somewhat differently constructed from that shown in the previous figures, namely the free end is shown bifurcated, one of the bifurcations constituting the hook portion 15^{a'} while the other bifurcation 15^{b'} constitutes the tripping mechanism engaging portion. The member 15', as in the case of member 15, is preferably curved in the arc of a circle identical with that described by the reproducer arm B; and the member 15' is controlled by the coil spring 17' one end whereof is secured to the member 15' while the other end of the spring 17' is secured to a lug on the supporting plate or member 14'. In order that the member 15' may be held against any upward movement, I prefer to provide the supporting plate or member 14' with the overlapping lug or portion 14^{a'}.

In this construction, the brake member 18', is pivoted at the point 19', and the one prong or bifurcation 18^{a'} is shown curved so as to engage with the outer periphery of the turn-table 10. The central or pivoted portion of member 18' is provided with a shoulder or protruding point 18^{b'} which is adapted to be engaged by the hook portion or member 15' when the device is adjusted or out of "braking" position. The brake member 18' is controlled by a coil spring 20', one end whereof is secured to the brake member 18' while the other end is secured to a suitable lug or point on the supporting plate or member 14', as clearly shown. The tendency of spring 20' is to move member 18' about its pivot and bring the bifurcation 18^{a'} against the outer periphery or flanged circumference of the record-carrying table

or member 10. In this construction the gear wheel 22' is rotatively mounted on the supporting plate or member 14', and this gear wheel 22' meshes with a pinion 37 secured to a spindle or shaft 38 which latter extends into the cabinet or box of the phonograph and is directly operated by the motor. The annular plate or member 31', as in the previous construction, is held in frictional engagement with the gear 22'. In this construction, the tripping member or lever 32' is shown in the nature of a Y and is pivoted at the point 33' to the member 31' and is also provided with a slot and pin connection at 34' with member 31' so as to allow of slight independent movement on the part of the tripping lever 32'. The long arm of the tripping lever 32' is shown slotted as at 35'; the slot being intended to receive the guide pin 36' which is secured to the reproducer arm B. As the reproducer arm B with the needle or stylus is moved toward the outer circle or groove of the record plate, it will compel the trip lever 32' to oscillate and thereby rotate annular plate 31' so as to bring the hook member engaging portion of lever 32' in proximity to the pivotal point 16' of member 15'. As the plate 31' merely has frictional contact with the gear 22', it is possible to rotate plate 31' independently of the rotation of gear 22'. The brake member 18' is then moved against the action of its spring 20' thereby bringing the turntable engaging portion 18^a out of contact with the periphery of the turn-table. This movement of the brake member 18' will bring the shoulder or tooth 18^c into engagement with the notch in the hook member 15'. The motor is then set in operation and thereby movement is imparted to gear 22' by reason of the pinion 37; the relation between the pinion and gearing being such that gear 22', and therefore member or plate 31', will revolve at substantially the same speed as the arm B of the phonograph. The trip lever 32' will move in unison with the reproducer arm B until the stylus or needle of the reproducer reaches the innermost circle of the record when further movement of the reproducer is stopped. As the motor will continue to operate and therefore shaft 38 will still be rotating the pinion 37 and gear 22', the pivotal point 33' will be moved toward the hook member 15' while the long arm of the trip lever 32' will be held against movement by reason of the pin 36 secured to the reproducer arm B which now is stationary. This holding tendency on the part of the reproducer arm will force the trip member 32' into contact with the hook member 15' which movement is made possible by reason of the slot and pin connection 34'. The movement of the trip lever 32' against the hook member 15' will move the latter out of engagement with the brake member

18' and therefore allow the action of spring 20' to force the brake member into contact with the turn-table 10 and hold the latter against further rotation and thereby stop the operation of the motor.

I have shown and described what I believe to be the simplest and best construction. I have shown, for example, the mechanism arranged on the top of the cabinet or box of the phonograph, but it will be readily understood that a portion of the device might be arranged within the cabinet or box and only the brake-member arranged where it can form a braking contact with the turn-table; and it is apparent that other modifications may be made in certain details without, however, departing from the spirit of my invention, and I, therefore, do not wish to be understood as limiting myself to the exact construction shown and described herein.

What I claim is:—

1. In a phonograph controlling device, the combination with a rotating member and operating mechanism therefor and a traveling member, a brake-member, means whereby said brake-member is held out of braking position, means operatively connected with the traveling member so as to be moved thereby, and means intermediate of the rotating member operating mechanism and said second mentioned means whereby the latter is given movement at an angle to the normal direction of travel thereof so that the first mentioned means is moved out of engagement with the brake-member and the latter permitted to move into braking relation with the rotating member.

2. In combination with a rotating member, operating mechanism therefor, and a traveling member, a controlling device comprising a pivotally mounted brake-member adapted to engage with the rotating member, means whereby said brake-member is held out of braking position, pivotally mounted means operatively connected with the traveling member so as to be controlled thereby, and rotatably mounted means arranged intermediate of the rotating member operating mechanism and the second mentioned means whereby the second mentioned means is given movement at an angle to the normal direction of the travel thereof when the traveling member becomes stationary so that the first mentioned means is moved out of engagement with the brake-member and the latter permitted to move into braking engagement.

3. In combination with a rotating member and a traveling member, a controlling device comprising a brake-member, a spring controlled member normally engaging said brake-member to hold the same out of operative position, a pivotally mounted lever adapted to be controlled by said traveling

member, and rotating mechanism operatively connected with said lever and arranged to move with the traveling member, said mechanism, when the traveling member
 5 is stationary being adapted to give movement to the lever in a direction at an angle to the normal direction of travel whereby said lever will move said spring controlled member out of holding engagement with the
 10 brake-member.

4. In combination with a rotating member, operating mechanism therefor, and a traveling member, a controlling device comprising a brake-member adapted to engage
 15 with the rotating member, a movable arcuate member normally held in engagement with said brake-member to hold the latter out of braking position, a pivotally mounted lever operatively connected with the traveling
 20 member while one end of the lever is adapted to move in juxtaposition to said arcuate member, and rotating means operatively connected with said lever and with the rotating member operating mechanism,
 25 said rotating means being arranged to move the end of said lever against said arcuate member when the traveling member becomes stationary, thereby moving the arcuate member out of holding engagement with the
 30 brake-member.

5. In combination with a rotating member, rotating mechanism therefor, and a traveling member, a controlling device comprising a brake-member normally adapted to
 35 form braking engagement with the rotating member, a spring controlled pivoted member normally holding said brake-member in inoperative position, a bifurcated lever pivotally secured at one of the bifurcations and
 40 in operative engagement with the traveling member, and means adapted to be rotated by the rotating member rotating mechanism and in operative engagement with said lever whereby the latter is forced against said
 45 spring controlled pivoted member so as to release the brake-member when the traveling member becomes stationary.

6. In combination with a rotating member, operating mechanism therefor, and
 50 a traveling member, a controlling device comprising a spring controlled brake-member, an arcuate member pivoted at one end and normally holding said brake-member out of braking position, a pivoted lever
 55 adapted to move through the arc of a circle corresponding with the arc described by said arcuate member, said lever having operative connection with the traveling member, and rotating means intermediate of said
 60 lever and the rotating member operating mechanism whereby the lever is forced against said arcuate member when the traveling member becomes stationary, thereby releasing the brake-member.

65 7. In combination with a rotating mem-

ber, operating mechanism therefor, and a traveling member, a controlling device comprising a spring controlled brake-member adapted to form braking engagement
 70 with said rotating member, a spring controlled arcuate member adapted to normally hold the brake-member out of braking position, a pivoted lever having slot and pin connection with said traveling member, one
 75 end of said lever being adapted to describe the arc of a circle corresponding with that described by the arcuate member, and rotating means intermediate of the rotating
 80 member operating mechanism and said lever, said rotating means having a yielding operative connection with the lever and adapted to move said lever angularly to the arc of a circle normally described thereby
 85 so as to force the same against said arcuate member and release the brake-member.

8. A phonograph controlling device comprising in combination with a rotating member, operating mechanism therefor, and a traveling member, a rotating member engaging
 90 element, a locking member adapted to hold the rotating member engaging element out of operative position, and means adapted to move with the traveling member and be controlled thereby, said means being
 95 adapted to be affected by the rotating member operating mechanism when the traveling member becomes stationary whereby said means is given movement in a direction
 100 lengthwise of the traveling member thereby moving the locking member out of engagement with the rotating member engaging element and permitting said last mentioned element to come into braking engagement
 105 with the rotating member.

9. A phonograph controlling device comprising in combination with a rotating member, operating mechanism therefor, and a traveling member, a spring controlled
 110 brake member adapted to form engagement with the rotating member, a holding member whereby said first mentioned member is held out of engagement with the rotating member, a third member adapted to move
 115 with the traveling member and having operative engagement with the holding member and means intermediate of said last mentioned member and the rotating member operating mechanism whereby said member
 120 is given movement independently of that imparted thereto by the traveling member, so that said member will force the second or holding member out of engagement with the first mentioned member and permit the latter to form braking engagement with the
 125 rotating member.

10. A phonograph controlling device comprising in combination with a rotating member, operating mechanism therefor, and a traveling member, a member adapted to
 130 form braking engagement with the rotating

member, means whereby said member is held out of braking position, a second member adapted to move with the traveling member and be controlled thereby, and means intermediate of one end of said last mentioned member and the rotating member operating mechanism whereby said member is given movement lengthwise of the traveling member when the latter becomes stationary, thereby moving the first mentioned means out of engagement with the rotating member engaging member and permitting the latter to form braking engagement with said rotating member.

11. A phonograph controlling device comprising in combination with a rotating member, operating mechanism therefor, and a traveling member, a brake member, a second member whereby the brake member is held out of braking position, means having operative relation with said second member and arranged to move the traveling member and be controlled thereby and means adapted to be rotated by the rotating member operating mechanism and having controlling relation with said first mentioned means, whereby said first mentioned means is given movement different from that of the traveling member and a second member forced out of engagement with the brake member thereby permitting the latter to come into engagement with the rotating member.

12. A phonograph controlling device comprising in combination with a rotating member, operating mechanism therefor, and a traveling member, a brake member, a second member whereby the brake member is held out of braking position, and means having operative relation with said second member and with the traveling member and adapted to move with the latter, said means being adapted to be affected by said operating mechanism when the traveling member becomes stationary, whereby said means will force the second or holding member out of engagement with the braking member and permit the latter to form braking relation with the rotating member.

13. In combination with a rotating member, operating mechanism therefor, and a traveling member, a controlling device comprising a brake-member, a holding member adapted to hold the brake-member out of braking position, pivoted means arranged to be controlled by said traveling member

and adapted to affect said holding member, and means arranged to be affected by the rotating member operating mechanism and adapted to affect said pivoted means and impart movement thereto when the traveling member becomes stationary.

14. In combination with a rotating member, operating mechanism therefor, and a traveling member, a controlling device comprising a brake-member, an oscillatingly mounted holding member arranged to extend throughout the path of the traveling member, said member being adapted to normally hold the brake-member out of braking position, pivoted means arranged to travel with the traveling member and adapted to affect said holding member, and means adapted to be operated by the rotating member operating mechanism, said means having frictional engagement with the means arranged to travel with the traveling member whereby said last mentioned means will be given movement substantially at right angles to the oscillatingly mounted holding member and force the latter out of holding contact with the brake-member.

15. In combination with a rotating member, operating mechanism therefor, and a traveling member, a brake-member, means whereby the brake-member is held out of braking position, means arranged to move with said traveling member and be controlled thereby, said means being arranged to affect said first-mentioned means, and means having operative relation with said last mentioned means whereby said means is given a secondary movement when normal movement of the traveling member is prevented, thereby releasing the brake-member.

16. In combination with a rotating member, operating mechanism therefor, and a traveling member, a brake-member, means adapted to have movement with the traveling member and arranged to affect the brake-member, and means having operative relation with said last mentioned means whereby said means is given a secondary movement when normal movement of the traveling member is prevented, so that the brake-member is operated.

BURR B. BLOOD.

Witnesses:

GEORGE HEIDMAN,
R. E. WIGHTON.

SOUND REPRODUCING MACHINE FOR ADVERTISING
PURPOSES.

1,193,762 ----- Edward L. Christensen
Patented Aug. 8, 1916.
Filed Nov. 20, 1914.

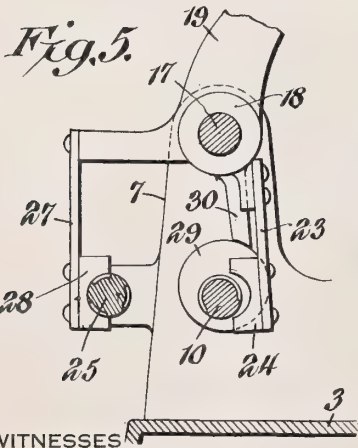
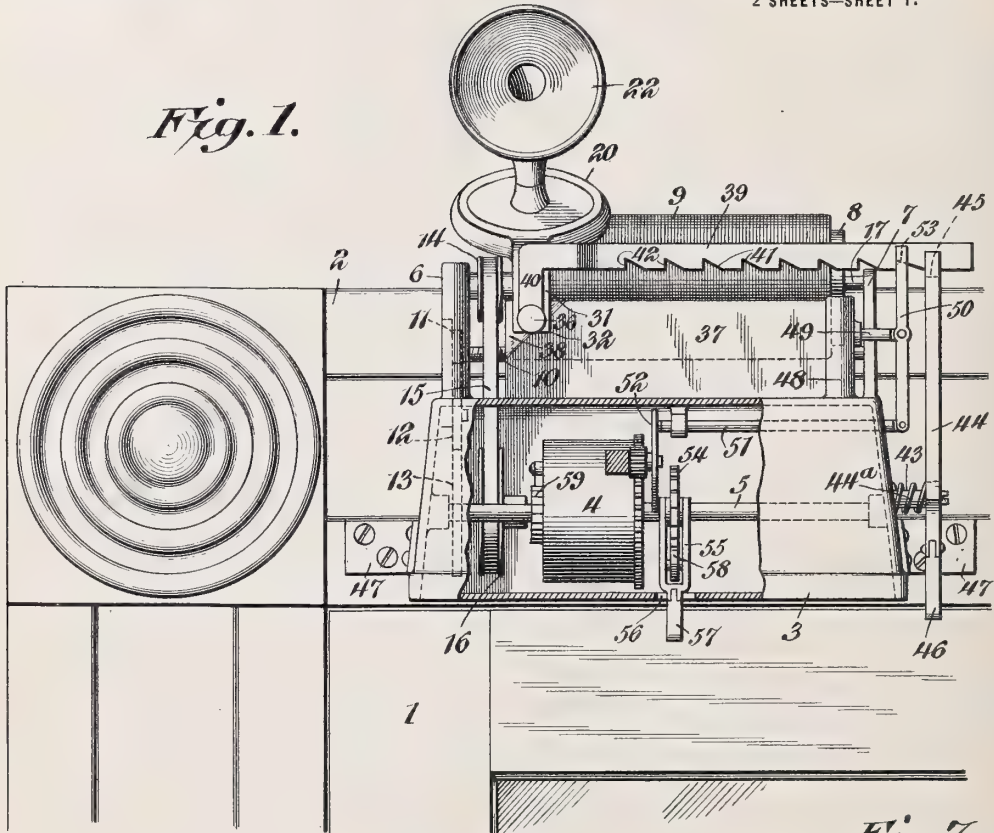
E. L. CHRISTENSEN.
SOUND REPRODUCING MACHINE FOR ADVERTISING PURPOSES.
APPLICATION FILED NOV. 20, 1914.

1,193,762.

Patented Aug. 8, 1916.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

Howard D. Orr.
F. J. Chapman

Fig. 6.

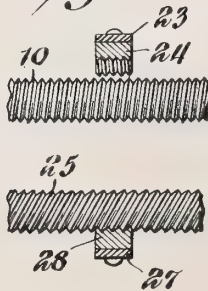
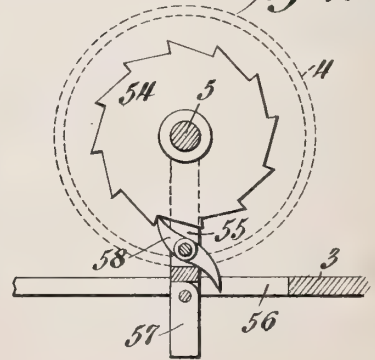


Fig. 7.



E. L. Christensen INVENTOR

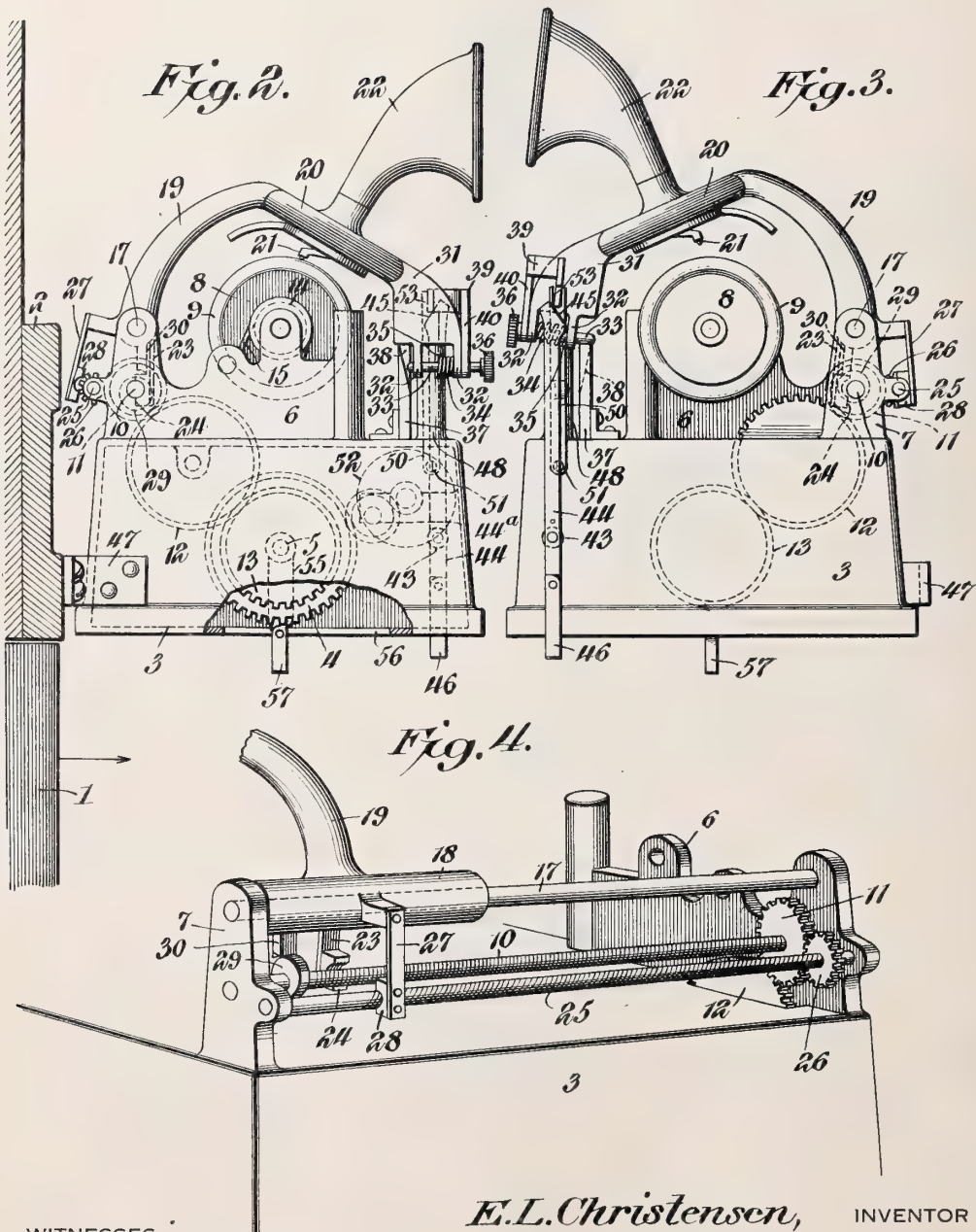
BY *E. J. Siggers*

ATTORNEY

E. L. CHRISTENSEN.
SOUND REPRODUCING MACHINE FOR ADVERTISING PURPOSES.
APPLICATION FILED NOV. 20, 1914.

1,193,762.

Patented Aug. 8, 1916.
2 SHEETS—SHEET 2.



WITNESSES

Howard D. Orr.
F. J. Chapman

E. L. Christensen, INVENTOR

BY E. J. Siggers.
ATTORNEY

UNITED STATES PATENT OFFICE.

EDWARD L. CHRISTENSEN, OF ANN ARBOR, MICHIGAN, ASSIGNOR OF ONE-HALF TO
WILLIAM J. ROSS, OF DETROIT, MICHIGAN.

SOUND-REPRODUCING MACHINE FOR ADVERTISING PURPOSES.

1,193,762.

Specification of Letters Patent.

Patented Aug. 8, 1916.

Application filed November 20, 1914. Serial No. 873,182.

To all whom it may concern:

Be it known that I, EDWARD L. CHRISTENSEN, a citizen of the United States, residing at Ann Arbor, in the county of Washtenaw and State of Michigan, have invented a new and useful Sound-Reproducing Machine for Advertising Purposes, of which the following is a specification.

This invention relates to sound reproducing machines, and its object is to provide such a machine so constructed as to emit words, phrases, or sentences constituting advertising or other matter on the occasion of certain acts performed by various persons.

In accordance with the present invention a sound reproducing or talking machine is provided with a sound record which may contain numerous repetitions of the same words, phrases or sentences for successive reproduction thereof, or may contain any desired recorded sounds either for advertising or for announcement purposes. The talking machine is so constructed and arranged that it may be made fast to a door casing above the door in such manner that on opening the door the talking machine is set into motion and reproduces a suitable portion of the record, after which the machine is automatically stopped. The opening of the door also winds up the propelling spring of the talking machine to an extent compensating for the active movement of the talking machine caused by a previous opening of the door. The talking machine is primarily wound up to a desired extent and is kept wound up to the extent it unwinds on each active movement of the talking machine by the opening movements of the door.

It is the purpose of the present invention to install the talking machine over store doors or other doors leading into rooms entered by customers or others to whom the announcements made by the talking machine may be of interest. The customer on opening the door sets the talking machine in motion, though this may be an unconscious act on the part of the customer, and the machine continues in operation for a time for which it may be prearranged, and then automatically stops. Successive openings of the door cause the talking machine to be set in motion each time the door is opened, until finally the sound reproducing element has reached the limit of its travel, whereupon such sound reproducing element, custom-

arily called the sound box, is returned to the initial position by the automatic operation of suitable mechanism. Since the spring usually employed in such machines is wound up before each operation to the extent which it runs down during such operation, the spring remains wound to the original condition, and if the spring be wound up initially to the proper tension, the only thing which will cause the spring to run below its initial tension will be the power consumed in returning the sound box from the position representing the end of its travel to the beginning point of such travel. Even this may be provided for by so adjusting the intermittent winding actions that each winding action is slightly in excess of the amount required to restore the used energy on each operation of the talking machine for reproduction of sound. The machine is capable of such adjustment with respect to the winding as to run indefinitely, the power needed to maintain the motor spring under proper tension being supplied by the persons traversing the door passage. The arrangement is also made in such a way that the talking machine may respond to, say, the opening movement of the door and be unresponsive to the closing movement thereof.

The invention will be best understood from a consideration of the following detailed description, taken in connection with the accompanying drawings forming a part of this specification, with the further understanding that while the drawings show a practical form of the invention, the latter is not confined to any strict conformity with the showing of the drawings, but may be changed and modified so long as such changes and modifications mark no material departure from the salient features of the invention.

In the drawings:—Figure 1 is a front elevation with some parts broken away and showing the invention applied to a door frame. Fig. 2 is an end elevation of the structure of Fig. 1 with some parts broken away to disclose more distant parts and the door frame shown in cross-section. Fig. 3 is an elevation of the end of the talking machine structure remote from that seen in Fig. 2, some of the parts being in a different position from that shown in Fig. 2. Fig. 4 is a perspective view of a portion of the mechanism embodied in the present invention.

Fig. 5 is a fragmentary cross-section through the feed screws and adjacent parts. Fig. 6 is a fragmentary section through the feed nuts and also showing small sections of the feed screws in their relative positions with respect to the feed nuts. Fig. 7 is a fragmentary section showing a portion of the re-

winding structure. Referring to the drawings there is shown a door 1 and one corner of a door frame 2, the door being assumed to open toward the observer in the showing of Fig. 1 and the corner illustrated being that remote from the hinge side of the door.

There is provided a box or casing 3 designed to house the motor mechanism of the talking machine, which motor mechanism is not shown in the drawings, but is simply indicated by a spring casing 4 and arbor 5 and some other parts which will be named as needed.

The motor mechanism in its specific construction does not enter into the present invention as a part thereof, and hence has been omitted in most part from the drawings as unnecessary for an understanding of the invention, and as liable to cause confusion with those parts of the structure peculiar to the present invention.

On top of the casing 3 are end members 6, 7, respectively, carrying the usual mandrel 8 designed to receive a sound record indicated at 9, and in the particular instance shown as of the cylinder type.

The end members 6 and 7 rising from the top of the casing 3 carry the usual feed screw 10 driven by gearing members 11, 12, propelled from that portion of the mechanism driven by the spring 4, as, for instance, by a primary driving gear 13. It is customary in the type of machine illustrated to drive the mandrel 9 by a pulley 14 and belt 15, the latter receiving motion from another pulley 16 connected up by suitable gearing, not shown, with the power gear wheel 13.

Mounted in the end members 6 and 7 is a guide rod 17 for a carriage sleeve 18. Projecting from this sleeve 18 is an arm 19 appropriately curved or otherwise shaped to overhang the mandrel 8 and record tablet 9 thereon, and at the outer end of this arm 19 there is mounted a sound box 20 provided with a stylus 21 and carrying an amplifying horn 22. The sleeve 18 also carries by an arm 23 a half nut 24 adapted to move into and out of mesh with the feed screw 10.

The parts so far described may in the main correspond to similar parts in different forms of talking machines of the graphophone or phonograph type employing cylindrical tablets, but it will be understood that certain features of the present invention are adaptable to other types of talking machines. It will be understood, there-

fore, that the present invention in the principles thereof is not of necessity confined to the cylinder type of sound reproducing or talking machines.

It will be further understood that while certain features of the machine illustrated are shown as uncovered or exposed, protecting casings or coverings are provided wherever needed after the usual custom in machines of the general character to which the present invention relates. As an instance of this it is customary to inclose the feed screw 10 in a protecting shield or tube, but such structure has been omitted in the showing of the drawings in order that parts material to the present invention are not hidden or confused by a too specific disclosure of structures not entering directly into the present invention. There is also provided another screw shaft 25 mounted in the end members 6 and 7 and extending between them. This shaft carries a gear pinion 26 smaller than and meshing with the gear wheel 11 wherefore the shaft 25 rotates faster than the shaft 10. The screw threads of the shaft 10 are usually of fine pitch, while the threads of the shaft 25 may be of a much coarser or elongated pitch for a purpose which will presently appear.

The sleeve 18 carries another arm 27 in turn carrying a half nut 28 adapted to mesh with the threads of the screw shaft 25, but the arrangement is such that when one half nut, say, the nut 24, is in mesh with the shaft 10, the half nut 28 is out of mesh with the shaft 25 and vice versa. These movements into and out of mesh of the two half nuts are brought about by a rocking movement of the sleeve 18 on the rod 17. The weight of the sound box 20 and arm 19 tends to rock the sleeve 18 in the direction to move the half nut 24 into mesh with the rod 10; and under these conditions the stylus 21 is in engaging relation with some portion of the sound groove upon the record tablet 9. When a force is exerted upon the sound box 20 and arm 19 in opposition to the force of gravity and sufficient to overcome it, the nut 24 is moved out of engagement with the rod 10 and the nut 28 is moved into engagement with the rod 25. This force in opposition to the force of gravity is exerted by a cam 29 mounted on the shaft 10 and at an appropriate time engaging a pin or finger 30 carried by the sleeve 18 and so related to the cam that the sleeve 18 is rocked sufficiently to lift the stylus 21 away from the record tablet 9 and also to bring into operation certain other devices which will be described farther on.

The sound box 20 on the side thereof remote from the arm 19 is provided with a lug or projection 31 having a downward drop in front of the mandrel 8 and sound record 9 thereon and there terminating in two parallel

eyes 32 together carrying a pin 33 urged toward the mandrel by a spring 34 carried by the pin. This spring at one end engages one of the eyes 32 and at the other end engages a pin 35 traversing the pin or rod 33. That end of the pin or rod 33 constituting the outer end thereof is provided with a manipulating head 36 permitting the pin or rod 33 to be moved lengthwise whenever desired. Extending along that portion of the top of the casing 3 adjacent to the front thereof which corresponds to the part of the casing toward which the amplifier 22 projects, is an upright guide plate 37, the top of which is at a suitable height and so related to the pin 33 as to constitute a track therefor. When the pin is upon the top of the plate 33 the stylus 21 is in the inactive position, that is, it is elevated from the sound record 9, and at the same time the half nut 28 is in mesh with the screw shaft 25. At that end of the track or plate 37 corresponding to the beginning end of the record tablet 9 the plate is formed with a downward and forward bevel 38 so positioned that when the pin or rod 33 reaches this beveled portion, the weight of the sound box is sufficient to cause the sound box to drop, since it is no longer supported by the pin 33 on top of the track plate 37. The bevel 38 facilitates this movement, and when the sound box is again moved forward the bevel 38 causes a movement of the pin 33 in opposition to the spring 34 until the corresponding end of the pin then engages against the outer face of the plate 37, and so offers no material impediment to the movement of the sound box in the active direction. Such active movement is brought about by the main feed screw 10 with which the half nut 24 engages when the sound box drops as described, and the drop of the sound box is so regulated that the stylus 21 is then in proper relation to the sound groove in the tablet 9. The lug 31 may in this position of the parts engage on top of the track plate 37, thus holding the sound box from dropping beyond a predetermined limit. Both arms 23 and 27 may be of an elastic nature, so that the respective half nuts 24 and 27 are held in appropriately firm engagement with the feed screws without putting any parts under undue strain.

Carried by the lug 31 is an arm 39 having an angle end 40 pivoted to the lug 31 by the pin 33 or otherwise, so that the arm 39 is practically horizontal. The edge of the arm 39 which may then constitute the lower edge is formed with a series of one-way notches 41, each ending in an abrupt shoulder 42 and slanting from this shoulder until merging into the under edge of the arm.

Pivoted upon a stud 43 projecting from the casing 3 is a rock arm or lever 44 extending approximately upright in the installed position of the device. The upper end of the

lever 44 is formed with a bevel 45 so positioned as to override the arm 39. The lower end of the lever 44 has an extension 46 hinged to the lever so as to freely move one way, but cause movement of the lever with it in the other direction, and this extension 46 is of such length that when the talking machine casing 3 is made fast to the lintel portion of the door casing by brackets 47 or otherwise, the lower end of the extension 46 is in the path of the door 1 on its opening movement to cause a corresponding movement of the lever 44. When, however, the door is closed the extension 46 freely yields on its hinge to permit the closing of the door without active participation of the lever 44.

Projecting from a post 48 erected on the casing 3 at the same end of the latter as the lever 44 is a pin or stud 49, on which is fulcrumed a rock arm 50. One end of this arm, constituting the lower end thereof, is pivotally connected to a slide rod 51 extending into the interior of the casing and bearing against a friction disk 52, which may be the usual friction disk provided in the governor structure of the talking machine driving mechanism, but which governor structure is omitted from the drawing. The outer end of the rock arm or lever 50 and constituting the upper end thereof is bifurcated as shown at 53, so as to straddle the arm 39 from below. This lever 50 is so arranged that it will engage in any one of the notches 41 and be engaged by the shoulder 42 thereof for operations to be described.

Mounted on the arbor 5 is a ratchet wheel 54 and also mounted on the arbor is a rock arm 55 which in normal position projects downwardly through an opening 56 in the bottom of the casing 3 for a sufficient distance to be in the path of the door 1 in the installed position of the talking machine. The lower end of the arm 55 has a one-way hinged extension 57 and the arm 55 also carries a pawl 58 designed to engage the teeth of the ratchet wheel 54.

The spring contained within the casing 4 has the usual pawl and ratchet stop mechanism 59.

Let it be assumed that the talking machine is properly installed upon the door casing with the arm extensions 46 and 57 suitably positioned to be engaged by the door 1 on the opening movement of the latter, and let it further be assumed that the door closes the entrance to a store, although it may be as well assumed that this door closes the entrance to any other room where it may be desired to install the apparatus of the present invention. Let it be further assumed that upon the record tablet 9 there is a series of announcements which may or may not be all alike, and each of which is of sufficient length to correspond to the distance between two notches 41 of the arm or

bar 39. It is also assumed that the spring within the spring barrel or casing 4 has been wound to a desired tension amply sufficient to propel the mechanism. The tendency of the power spring is to rotate the shaft 10 to which it may be considered as constantly connected. The forward tendency is imparted to the sleeve 18 corresponding to the usual sound box carriage, so that there is a constant tendency to move the sound box over the sound record in the forward direction, so as to reproduce sounds from the sound record under the further assumption that the stylus 21 is in engagement with the sound record groove of the sound record tablet 9 which it is when the parts are ready for reproduction of the recorded sounds. Suppose, now, that some person, a customer or other person, opens the door 1. Such door first engages the extension 57 in a manner to swing the arm 55 about the arbor 5 as a pivot and engage and move the ratchet 54 in a direction to wind the spring a certain amount. This winding action may be delivered directly on the arbor 5 or through any suitable increasing or reducing mechanism, so as to impart to the spring within the drum or barrel 4 a winding movement representing the force expended in the reproduction of the desired amount of the sound record. As soon as the door has passed the arm 55 it falls back to its normal pendent position either by gravity or because of some suitable force applied thereto, as by a return spring or otherwise. Now the door in its further opening movement comes into contact with the extension 46 of the lever 44 and causes a rocking movement of the latter to an extent bringing the beveled end 45 into engagement with the under edge of the arm or bar 39 to raise this bar sufficiently to escape from engagement with the upper end of the lever 50. The propelling mechanism of the talking machine is thus released from locking engagement with the lever 50 through the shoulder 42 of the particular notch 41 in which the upper end of the lever was seated, and the mechanism begins to actively move, since pressure of the rod 51 upon the disk 52 was removed by the lifting of the bar 39 from locking engagement with the lever 50. The further opening of the door releases the lever 44 which at once is moved back to its first position by a spring 44^a or otherwise, and also may be urged to such position by the weight of the bar 39. In the meantime, however, the mechanism has moved sufficiently to bring the bottom edge of the bar 39 into the bifurcated upper end of the lever 50, so that no shoulder 42 is at the time in position to engage the lever 50 to bring about a stopping of the mechanism. The talking machine, therefore, continues to operate and the recorded sounds are reproduced and in-

tensified through the amplifier 22, so that persons within the store, and especially customers, are given certain information which may be of an advertising or instructive character. This continues until the next notch 41 in order is brought into coincidence with the lever 50, whereupon the arm 39 drops as permitted by the notch into the bifurcated upper end of the lever 50, so that the next shoulder 42 ultimately engages the lever and the continued movement of the sound box carriage progressively rocks the lever 50 until the rod 51 engages the disk 52 with sufficient frictional intensity to stop the mechanism. While this operation is progressing the door may have been closed, but the extensions 46 and 57 being one way extensions, yield inactively to the closing movement of the door. When the door is again opened the same operations follow, except that the next portion of the record tablet in order is reproduced. Successive openings of the door cause successive reproductions of the record tablet through progressive portions thereof until finally the end of the active travel of the reproducer and its carriage has been reached. This brings the finger 30 into the path of the cam 29 and the parts are so timed that at this point the continued rotation of the power screw shaft 10 causes a rocking movement of the carriage sleeve 18 sufficient to lift the sound box out of active engagement with the sound record 9, whereupon the pin 33 is propelled by its spring 34 into overriding relation to the upper edge of the track plate 37. This action removes the half nut 24 from the feed screw shaft 10 and brings the half nut 28 into engagement with the return screw shaft 25, which because of its connection with the power side of the operating devices continues to rotate, but propels the carriage 18 in the reverse direction or toward the initial position. This is permitted by the bar 39 since the notches therein are one way notches and are inactive to the lever 50 when the carriage is reversed in movement. The reverse movement continues until the pin 33 reaches the bevel 38 of the track plate 37, whereupon the track no longer supports the carriage. The latter drops until the lug 31 arrests further movement by engagement with the top of the track plate 37 and the pin 33 is in the retracted position to move along the front upright face of the plate 37. The parts are so proportioned that in this position the last notch 41 toward the free end of the bar 39 is coincident with the lever 50, and the shoulder 42 by a slight forward movement of the sound box carriage engages the lever 50 and rocks the same so that the rod 51 is again moved into locking engagement with the friction disk 52. The machine is now in operative position ready to start again on the next opening of the door.

At each opening of the door the spring within the barrel 4 is wound up to an extent commensurate with the force expended by the spring in the operation of the device for the fractional reproduction of the record, so that prior to each operation of the mechanism there is stored in the spring an amount of power agreeable to that expended in such operation. As before explained, this storage of power may slightly exceed the amount expended in the sound reproducing action of the mechanism to provide for the return of the carriage at the limits of its travel in the reproducing direction.

The pitch of the return feed screw 25 may be much more rapid than that of the direct feed screw 10, so that the carriage is returned to its initial position without loss of time and without material interference with the use of the mechanism.

While the machine of the present invention has been described as constructed and located to be operated by the opening of a store or other like door, and especially when of a type hung upon hinges, it will be understood that the device of the present invention may be otherwise located and otherwise operated.

It will be understood that some other power means than a spring motor may be used to drive the mechanism. For instance, an electric motor might be employed, but as electrically driven sound reproducing machines are known it is not deemed necessary to illustrate such a structure, although the present invention is readily adaptable thereto.

What is claimed is:

1. A sound reproducing machine adapted to be intermittently set into operation by a movable object, said machine being provided with power storing means for its actuation, means under the control of the movable object in the installed position of the machine for causing progressive active movements of the sound reproducing parts of the machine with each of said movements limited to a fractional portion of the full range of movement of the said parts, and means also under the control of the movable object for restoring to the power storing means for each fractional actuation of the sound reproducing means an amount of power commensurate with that utilized in the said fractional actuation, the range of movement of the power restoring means being limited to the production of the stated restoration of power.

2. A sound reproducing machine provided with power storing means for its actuation, means for causing progressive active movements of the sound reproducing machine with each of such movements limited to a fractional portion of the full extent of movement of the machine, and means for

restoring to the power storing means for each actuation of the sound reproducing machine an amount of power commensurate with that utilized in the fractional actuation of the machine, the range of movement of the power restoring means being limited to produce the stated restoration of power, and the means for causing the fractional progressive actuations of the sound reproducing machine and the means for restoring power to the power storing means both having parts adapted to be located in the path of a movable object for actuation by the movements of the latter.

3. A sound reproducing machine provided with power storing means for its actuation, means for causing progressive active movements of the sound reproducing machine with each of such movements limited to a fractional portion of the full extent of movement of the machine, and means for restoring to the power storing means for each actuation of the sound reproducing machine an amount of power commensurate with that utilized in the fractional actuation of the machine, the range of movement of the power restoring means being limited to produce the stated restoration of power, and the means for causing the progressive fractional actuations of the sound reproducing machine and the means for restoring power to the power storing means being both provided with rockable members adapted to be located in the path of a two-way movable object and constructed to actively respond to movements of the latter in one only of the two directions.

4. A sound reproducing machine having means for driving it, means for releasing the machine to operation and stopping it after a predetermined fractional part of its full extent of operation, said starting and stopping means being susceptible of repeated actuations within the full limit of movement of the sound reproducing machine, and power restoring means having a range of active movement limited in extent to restore to the driving means only such an amount of power as is utilized by each limited active movement of the sound reproducing machine, said starting and stopping means and the power restoring means being constructed and arranged for successive actuations by a corresponding number of movements of a movable object.

5. A sound reproducing machine having means for driving it, means for repeatedly starting and stopping it at progressively different points along its full range of movement, means for delivering to the driving means an amount of power commensurate with that consumed in each active movement of the sound reproducing machine as often as such active movement occurs, and means for causing the return of the sound repro-

ducing machine to initial position on reaching the other limit of its movement, the starting and stopping means and the power restoring means being constructed and arranged to actively respond to movements of a movable object.

6. A sound reproducing machine provided with a sound record made up of a succession of recorded sounds designed to be reproduced in succession by corresponding movements of the sound reproducing machine each including a corresponding fractional portion of its full movement, an energized driving means for the machine, means for starting the machine and stopping it after an extent of travel corresponding to one of the fractional portions of the sound record, and means for restoring to the driving means an amount of power commensurate with that consumed in the actuation of the machine through the fractional portion of its full movement as often as such fractional movement occurs, said starting and stopping means and the power restoring means being constructed and arranged for actuation by the movement of a movable object.

7. A means for the purpose described, comprising a sound reproducing machine provided with an energized driving means, means for the support of the machine in operative relation to a movable object, means for starting and stopping the machine, and means for automatically restoring to the driving means an amount of power commensurate with that consumed in the running of the machine, said starting and stopping means and the power restoring means having operating parts extending therefrom into the path of movement of the movable object and located to be successively engaged by said object.

8. A means for the purpose described, comprising a sound reproducing machine adapted to be secured in operative position with respect to a door, said sound reproducing machine being provided with driving means having a constant tendency to act, means for releasing the machine to action and stopping it after a predetermined limited active movement less than the full range of movement of the machine, means for restoring to the driving means an amount of power commensurate with that consumed in the limited active movement of the machine as often as such limited active movement occurs, and means for returning the sound reproducing elements of the sound reproducing machine to initial position on the attainment of these parts to the limit of active movement after repeated limited operations, the releasing and stopping means and the means for restoring power being constructed and arranged in the path of the door for actuation thereby.

9. A sound reproducing machine having

means for driving it, means for repeatedly starting and stopping the machine within the range of full movement of the machine, and means for restoring to the driving means an amount of power commensurate with that utilized in each limited or fractional movement of the sound reproducing machine as often as such movement occurs, the means for controlling the movement of the machine and for restoring the power being constructed and arranged for actuation by movements of a movable object.

10. A means for the purpose described, comprising a sound reproducing machine adapted to be installed adjacent to a door, said machine having means for driving it, means for intermittently starting the machine and then stopping it after accomplishing a fractional portion of its full extent of movement, means for restoring to the driving means an amount of power commensurate with that consumed in each fractional active movement of the machine as often as such fractional active movements occur, and means for returning the sound reproducing elements of the machine to initial position after reaching the full limit of active movement, the starting and stopping means and the power restoring means having parts in the path of movement of the door for the actuation of said means, whereby the machine will operate successively to give repeated reproductions of the recorded sounds throughout an indefinitely long period of time.

11. A sound reproducing machine adapted to be intermittently set into operation by a movable object, said machine having sound reproducing elements and means for carrying a sound record, a driving spring for actuating the sound record and the sound reproducing elements, means under the control of the movable object for causing repeated startings and stoppings of the sound reproducing machine with each active movement of an extent to cause the reproduction of one of successive fractional portions of like extent of the sound record on the carrying means therefor, and winding means for the driving spring also under the control of the movable object and actuated thereby as often as the sound reproducing machine is actuated and of so limited a range of movement as to store power in the spring at each actuation only to an extent corresponding to the amount of power utilized in running the machine for the fractional part of its full range of movement.

12. A sound reproducing machine having sound reproducing elements and means for carrying a sound record, a driving spring for actuating the sound record and the sound reproducing elements, means for starting the sound reproducing machine and for stopping it after an active movement

representing a fractional portion of the full active movement of the machine, and a spring winding means having a range of movement so limited as to store at each actuation only so much power in the spring as corresponds to the amount of power utilized in running the machine for the fractional part of its full range of movement, said starting and stopping means and spring winding means having parts adapted to be engaged by a moving object for their actuation.

13. A sound reproducing machine having sound reproducing elements and means for carrying a sound record, a driving spring for actuating the sound record and the sound reproducing elements, means for starting the sound reproducing machine and for stopping it after an active movement representing a fractional portion of the full active movement of the machine, and a spring winding means having a range of movement to store power in the spring commensurate with the amount of power utilized in running the machine for the fractional part of its full range of movement, said starting and stopping means and spring winding means having parts adapted to be engaged by a moving object for their actuation, and said parts being relatively situated to cause the moving object to store the stated amount of power in the spring prior to the release of the machine to active movement and by one progressive movement of the movable object.

14. A means for the purpose described, comprising a sound reproducing machine having sound reproducing elements, a support for a sound record and a spring for driving said parts, said sound reproducing machine being constructed and arranged for attachment to a door frame adjacent to a door, starting and stopping means for the sound reproducing machine for releasing the sound reproducing machine to operation for a fractional portion of its full movement of operation, winding means for the spring having a range of movement limited in extent to store in the spring at each actuation only so much power as corresponds to that utilized in a fractional operation of the sound reproducing machine, and means for returning the sound reproducing elements to initial position after a number of fractional operations completing the full active movement of the machine, the starting and stopping means and the winding means having parts in the path of the door for the actuation of said parts by the movement of the door.

15. A sound reproducing machine provided with a power spring, means responsive to a movable object for causing a step by step reproduction of a sound record carried by the machine, and winding means for

the spring also responsive to a movable object and having its full range of movement limited in extent to store in the spring substantially the same amount of power as is utilized in actuating the sound reproducing parts of the machine through one step of its movement.

16. A sound reproducing machine provided with a power spring, means for causing a step by step reproduction of a sound record carried by the machine, and winding means for the spring having a limited range of movement to store in the spring only an amount of power commensurate with that utilized in actuating the sound reproducing parts of the machine through one step of its movement, said spring winding means comprising a ratchet, and an oscillatory pawl carrier and pawl thereon in operative relation to the ratchet, said pawl carrier having a projecting part adapted to be placed in the path of a moving object.

17. A sound reproducing machine provided with a power spring, means for causing a step by step reproduction of a sound record carried by the machine, and winding means for the spring having a range of movement limited in extent to store in the spring at each actuation only so much power as is commensurate with that utilized in actuating the sound reproducing parts of the machine through one step of its movement, said spring winding means comprising a ratchet, and an oscillatory pawl carrier and pawl thereon in operative relation to the ratchet, said pawl carrier having a projecting part adapted to be placed in the path of a moving object, and said projecting part having a one-way hinge connection to the remainder of the pawl carrier.

18. In a sound reproducing machine, a casing, sound reproducing parts mounted thereon, an actuating spring for the sound reproducing parts mounted within the casing, means for the step by step release and stopping of the sound reproducing parts, and means for winding the spring having a predetermined range of active movement to store in the spring at each actuation an amount of power equal to that utilized in driving the sound reproducing means through one step of movement.

19. In a sound reproducing machine, a casing, sound reproducing parts mounted thereon, an actuating spring for the sound reproducing parts mounted within the casing, means for the step by step release and stopping of the sound reproducing parts, and means for winding the spring having a limited range of active movement to store in the spring on each actuation only so much power as corresponds to that utilized in driving the sound reproducing means through

one step of movement, said spring winding means comprising a ratchet connected to the spring, and a rock member carrying a pawl in operative relation to the ratchet and provided with a one-way hinged extension projecting through the casing in position to be placed in the path of a moving object capable of actuating it.

20. A sound reproducing machine provided with a traveling carriage and sound reproducing means thereon, a power spring and connections therefrom to the carriage for driving the latter, a bar on the carriage participating in movements thereof and provided with notches arranged in a series of a length corresponding to the length of travel of the carriage, a stop member having means in position to control the power side of the talking machine and also having means for engaging in the notches in the bar on the carriage, and means for moving the bar out of engaging relation with the stop means.

21. A sound reproducing machine provided with a traveling carriage and sound reproducing means thereon, a power spring and connections therefrom to the carriage for driving the latter, a bar on the carriage participating in movements thereof and provided with notches arranged in a series of a length corresponding to the length of travel of the carriage, a stop member having means in position to control the power side of the talking machine and also having means for engaging in the notches in the bar on the carriage, and means for moving the bar out of engaging relation with the stop means, said last-named means comprising a rock arm or lever having one end beveled to engage the bar on the carriage and move it out of the path of the stop member associated with it and the other end in position to be engaged by a moving object.

22. A sound reproducing machine provided with a traveling carriage and sound reproducing means thereon, a power spring

and connections therefrom to the carriage for driving the latter, a bar on the carriage participating in movements thereof and provided with notches arranged in a series of a length corresponding to the length of travel of the carriage, a stop member having means in position to control the power side of the talking machine and also having means for engaging in the notches in the bar on the carriage, and means for moving the bar out of engaging relation with the stop means, said last-named means comprising a rock arm or lever having one end beveled to engage the bar on the carriage and move it out of the path of the stop member associated with it, and the other end in position to be engaged by a moving object, said talking machine also being provided with a winding means for its actuating spring also arranged in the path of the moving object and having a range of movement to impart to the spring an amount of power commensurate with that utilized in driving the sound reproducing parts of the machine a distance equal to the space between adjacent notches.

23. A sound reproducing machine provided with sound reproducing elements, a carriage therefor movable lengthwise of the machine, an upstanding plate elongated in the direction of travel of the carriage and constituting a track for supporting one end of said carriage, said plate having one end downwardly and forwardly beveled, and an elastically constrained pin on the carriage in operative relation to the track and the beveled end thereof.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

EDWARD L. CHRISTENSEN.

Witnesses:

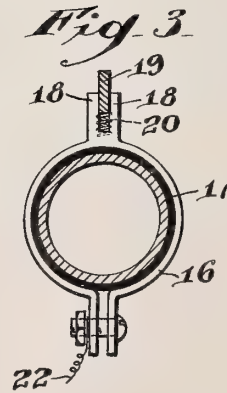
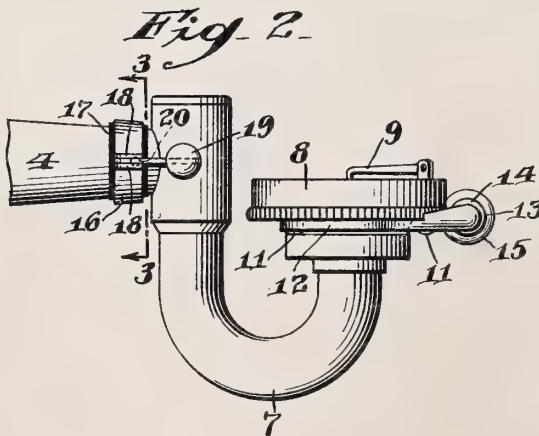
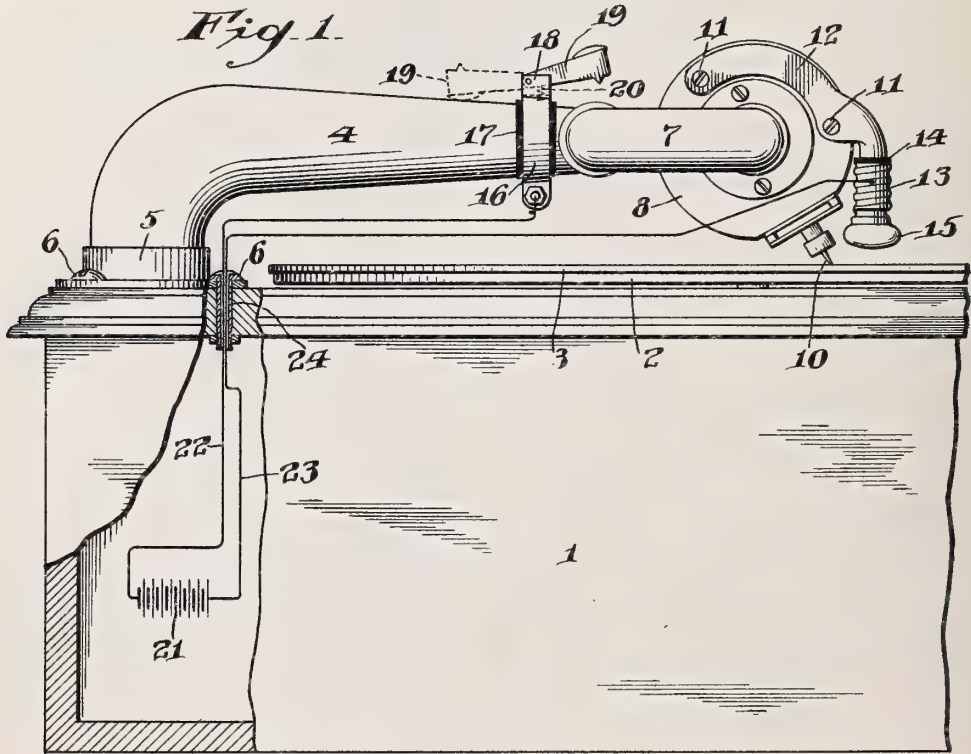
FRANCES M. DEAN,
ELEANOR L. PILKINGTON.

PHONOGRAPH,
1,193,825-----C. H. Roop,
Patented-August 8th, 1916.
Filed-August 21st, 1915.

C. H. ROOP.
 PHONOGRAPH.
 APPLICATION FILED AUG. 21, 1915.

1,193,825.

Patented Aug. 8, 1916.



Inventor

Witnesses
 Thos. Roseman.
 C. R. Ziegler.

Clarence H. Roop,
 By Joshua R. H. Hottel.
 Attorney

UNITED STATES PATENT OFFICE.

CLARENCE H. ROOP, OF CAMDEN, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS,
OF ONE-HALF TO GEORGE H. M. IVINS, OF CAMDEN, NEW JERSEY.

PHONOGRAPH.

1,193,825.

Specification of Letters Patent.

Patented Aug. 8, 1916.

Application filed August 21, 1915. Serial No. 46,598.

To all whom it may concern:

Be it known that I, CLARENCE H. ROOP, a citizen of the United States, residing at Camden, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

My invention relates to improvements in phonographs, the object of the invention being to provide an improved light attachment in which the electric lamp is supported on the sound box of the phonograph in position to throw the light upon the needle and the record, and provide improved means for closing the electric circuit to cause the illumination of the lamp at any time desired, either when the needle is against the record or when the box is elevated from the record.

A further object is to provide improvements of the character stated which can be manufactured and sold at a reasonably low price without in any way altering the construction of the phonograph.

With these and other objects in view, the invention consists in certain novel features of construction and combinations and arrangements of parts as will be more fully hereinafter described and pointed out in the claims.

In the accompanying drawings: Figure 1 is a view in side elevation partly in section illustrating my improvements. Fig. 2 is a top plan view showing the free end of the tone arm and parts carried thereby, and Fig. 3 is an enlarged view in section on the line 3—3 of Fig. 2.

1 represents the box of a phonograph having a turn table 2 thereon supporting a record disk 3.

4 is the pivoted tone arm which is secured to the box by a socket member 5 having screws 6 holding the same in place.

7 is the ordinary goose neck pivotally connected to the free end of the sound arm, and carrying the ordinary sound box 8, to which the needle arm 9 is connected, and to which latter the needle or stylus 10 is secured in the ordinary way.

The several parts of the sound box 8 are secured together by screws 11, and certain of these screws 11 are utilized to secure my improved bracket 12 to the side of the box 8. This bracket 11 is curved throughout a portion of its length conforming in shape to the curvature of the box, and at its free end

is provided with a lamp socket 13. The socket 13 is insulated from the bracket by a ring 14, but the electric lamp 15 supported in the socket has one pole thereof electrically connected with the bracket for a purpose which will be hereinafter described.

A clamp 16 is secured around the tone arm 4, and is insulated from the tone arm by a ring 17. The clamp 16 is provided on its upper face with parallel ears 18, in which a switch arm 19 is pivotally mounted. This switch arm 19 is normally held in elevated position by a spring 20, and is adapted when forced downwardly to engage the end of the tone arm 4.

In the box 1, I locate an electric battery 21 to which wires 22 and 23 are connected. These wires 22 and 23 are preferably of the insulated type, and are projected through one of the screws 6, the latter having a central longitudinal bore 24 for the purpose as shown clearly in Fig. 1. Wire 22 is electrically connected with the clamp 16, while wire 23 is electrically connected to the socket 13.

Normally the circuit is broken, as there is a gap between the clamp 16 and one pole of the electric lamp 15. When the switch arm 19 is moved downwardly, the metal of the tone arm 4, goose neck 7, box 8, and bracket 12 operate as conductors to close the electric circuit, and cause the illumination of the lamp.

When it is desired to light the lamp for a short time, the arm 19 is pressed downwardly until its lower end contacts with the tone arm, and if for any reason it is desired to maintain the light for any considerable length of time, the switch arm can be thrown backward to the position shown in dotted lines, where it will remain by its own weight, and maintain the electric circuit closed.

As shown in Fig. 1, the lamp is in such position that it directs the light upon the record 3 where it is engaged by the needle 10, and this is of great importance as it enables the operator to readily find the groove in the record.

When it is desired to insert a new needle, the goose neck is thrown backward, as is customary, so that the needle is uppermost, and while in this position, the electric circuit is readily closed as above described, and the lamp will throw the light upon the

free end of the needle bar so that a needle can be easily placed in position.

It is a well known fact that records, particularly musical records, have a superior effect when played in the dark, and in such cases my improved attachment is of extreme importance, as it permits all manipulation of the phonograph with the necessary light whenever desired, yet during the playing operation the arm remains dark.

While I have referred to the source of electricity as a battery within the box, it is of course to be understood that I may utilize any source of electricity to be had.

Various slight changes might be made in the general form and arrangement of parts described without departing from my invention, and hence I do not limit myself to the precise details set forth, but consider myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination with a phonograph having a tone arm, a goose neck at the free end of the tone arm, and a sound box at the free end of the goose neck, of an electric lamp on the sound box, a pivoted switch arm insulated from the tone arm and movable to either side of its pivot, said switch arm adapted when moved downwardly

against the phonograph from either side of its pivot to close an electric circuit to the lamp, and a spring holding the switch arm elevated in one of its positions out of contact with the metal of the phonograph, substantially as described.

2. The combination with a phonograph having a tone arm, a goose neck at the free end of the tone arm, and a sound box at the free end of the goose neck, of a curved bracket secured to one side of the sound box and carrying an electric lamp at its free end in position to direct the light onto the needle carried by the sound box, a source of electricity, a clamp secured on the tone arm and insulated therefrom, a pivoted switch arm on the clamp movable to either side of its pivot, said switch arm adapted when moved downwardly against the phonograph from either side of its pivot to close the circuit to the lamp, and a spring normally holding the switch arm elevated in one of its positions out of contact with the metal of the phonograph, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CLARENCE H. ROOP.

Witnesses:

E. D. BROWN,
MARIE JACKSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

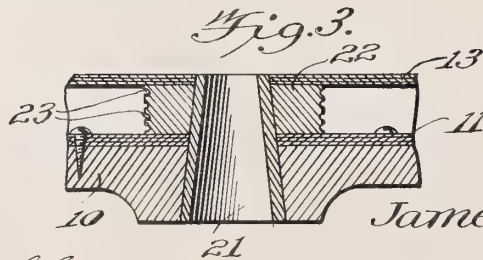
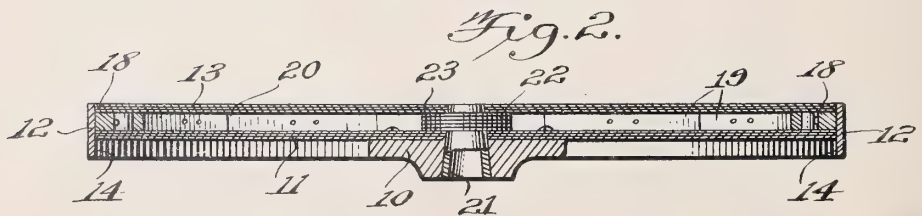
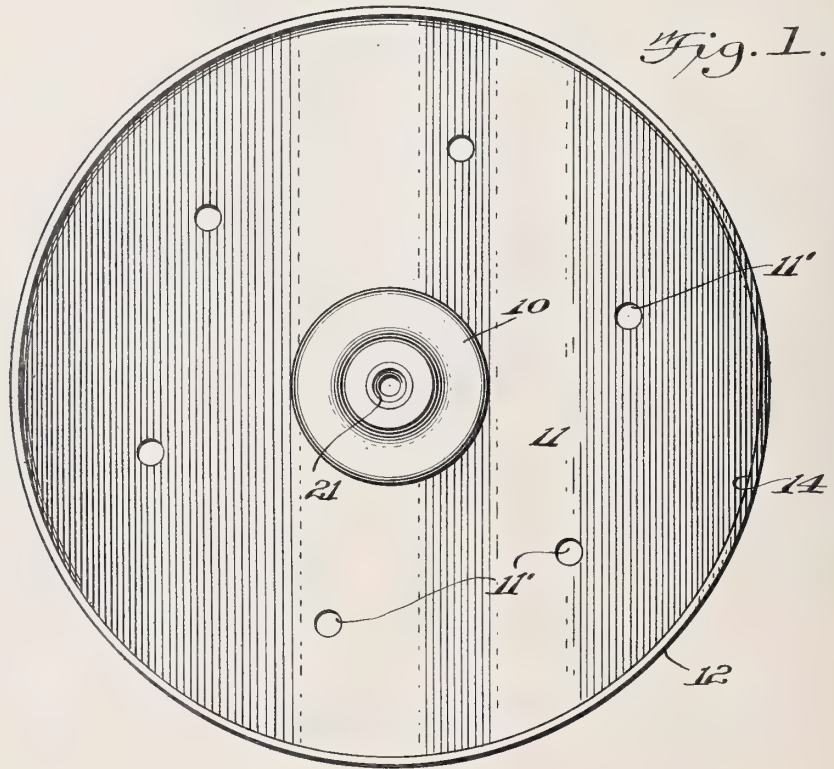
RESONANT BODY.

1,193,995 ----- James H. Collins.
Patented Aug. 8, 1916
Filed July 15, 1915.

J. H. COLLINS.
 RESONANT BODY.
 APPLICATION FILED JULY 15, 1915.

1,193,995.

Patented Aug. 8, 1916.
 2 SHEETS—SHEET 1.



Inventor

James H. Collins,

Witnesses

W. S. McLowell
 Douglas Leake

By

J. Stuart Freeman,
 Attorney

J. H. COLLINS.
 RESONANT BODY.
 APPLICATION FILED JULY 15, 1915.

1,193,995.

Patented Aug. 8, 1916.
 2 SHEETS—SHEET 2.

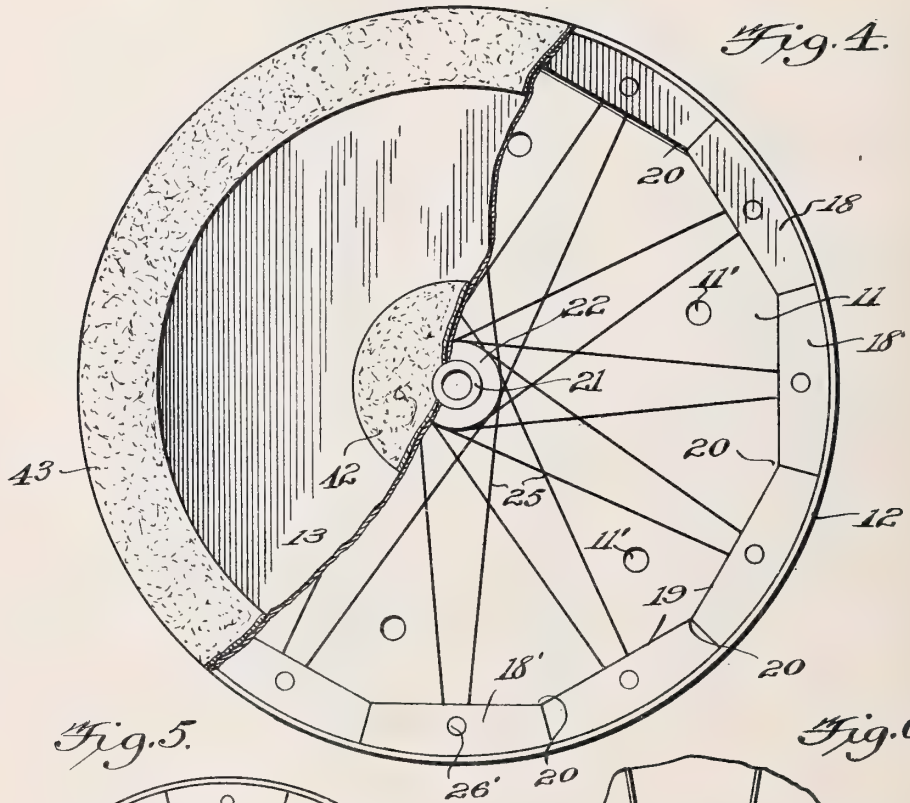


Fig. 5.

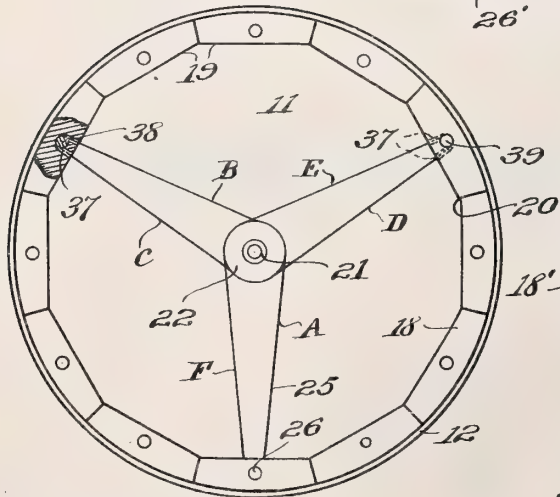
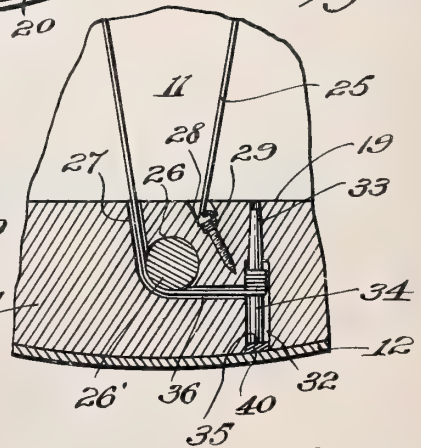


Fig. 6.



Inventor

James H. Collins

Witnesses

W. S. McLowell
 Douglas Leake

By J. Stuart Freeman,
 Attorney

UNITED STATES PATENT OFFICE.

JAMES H. COLLINS, OF HARRISBURG, PENNSYLVANIA.

RESONANT BODY.

1,193,995.

Specification of Letters Patent.

Patented Aug. 8, 1916.

Application filed July 15, 1915. Serial No. 39,952.

To all whom it may concern:

Be it known that I, JAMES H. COLLINS, of the city of Harrisburg, county of Dauphin, State of Pennsylvania, have invented certain new and useful Improvements in Resonant Bodies, of which the following is a full and exact description.

The object of the invention is to provide a hollow, resonant body for use particularly in conjunction with sound reproducing machines, said body being provided with members independently capable of being placed under varying degrees of tension.

More particularly the object is to provide a removable, hollow record support, adapted to universally fit any type of machine for reproducing sounds from disk records, though the principle involved is equally adapted to record supports of other types.

In this art there is often experienced a condition in which a given note, chord, or other sound, is incorrectly recorded, in which case it is desirable to reproduce the particular sound with its intended pitch, tone, and other characteristics; also, there is frequently a condition in which a correctly recorded sound is not reproduced with its intended individual qualities, because of the peculiarities of the particular reproducing machine employed, or because of the objects within the room or other inclosure surrounding or in the neighborhood of the said machine. Such conditions as these, the present invention is designed to counteract to the end that the actual sound recorded is the sound actually heard, it being understood that to impair the results obtained in reproducing a record it is not necessarily true that the pitch, or other quality, should be extremely incorrect. This briefly is accomplished by reinforcing, or augmenting, the respective sounds reproduced by the usual sound box, and before they leave the machine, by a series of vibrant, tensioned members supported in conjunction therewith.

It has been found that in the ordinary sound reproducing machine, a considerable vibration is imparted to the record support by reason of the irregular, vibratory co-operation existing between the usual disk and the reproducing stylus: in the case of a "hill and dale" record this vibration, caused by the stylus riding over the vertical irregularities of the groove, is substantially perpendicular to the plane of the record sup-

port, while with a lateral cut record, the vibration is substantially parallel with the plane of the said support, and is to a great extent impressed upon the upper portion of the spindle passing through the record disk. In this invention it is the object to utilize this vibration to transmit to perfectly tuned strings, or other members, the characteristic vibrations of a record, it being a well-known fact that when a given period of vibration, as that of a sound conveyed through substantially any known medium, comes into contact with, or by mechanical means is impressed upon, a vibrant body possessing substantially the same natural period of vibration, said body responds and tends to modify, augment, or reinforce, the original sound. Furthermore, if there is but a relatively slight difference in the two characteristic periods of vibration, the string responds though less energetically, and if sufficiently strong tends to correct the audible sound emitting from the machine.

In the preferred embodiment of the invention there is provided a plurality of correctly tuned strings, which by reason of their peculiar characteristics are adapted to respond to a greater or less degree to practically any period of vibration impressed upon them through the medium of the walls of the hollow record support, and in thus responding they have a positive tendency to clarify and enrich the sound reproduced. Furthermore, while there are certain recorded sounds characteristic of particular instruments to which they respond more freely, their effect upon the reproduction of all sounds is marked, these including even that of the human voice.

In the drawings Figure 1 is a bottom plan view of the preferred form of the device; Fig. 2 is a vertical diametrical section of the same with the strings removed; Fig. 3 is an enlarged detail section of the central portion of the same including the combined hub, and bridge; Fig. 4 is a plan view of the device showing the annular record supporting members, and partly in section with the top wall removed; Fig. 5 is a plan view of the same, showing the course of one of the vibratory elements; and Fig. 6 is an enlarged detail section of one of the string tensioning means.

Referring to the drawings specifically, there is provided an annular hub 10, which

may be so shaped as to conform to the turntable spindle of any type of machine, while rigidly carried by said hub is an annular, plane member 11, preferably made of three-ply veneer, provided with spaced apertures 11' to emit the sound waves therefrom, and bounded at its periphery by an annular rim 12, extending upwardly and supporting a second plane member 13, and downwardly to form a flange 14 with which certain types of brakes may coöperate to stop the movement of the turntable as a whole.

The felly 18 of the turntable is preferably formed of a series of members having rectilinear inner faces 19 comprising geometric chords of the circular interior, and at their adjacent ends forming angular recesses 20, which with the central portions of the said chords operate to cause a churning or circulation of the air within the interior of the device, the presence of which has proved to be an advantage over the results obtained from a perfectly cylindrical interior.

The upper and lower members 13 and 11 at their central portions are apertured to receive the cylindrical, frusto-conical, or other, lining 21, which extends downwardly through the hub 10, while they are spaced apart by means of a centrally apertured, circular member 22, provided with a plurality of spaced peripheral grooves 23, in which lie the respective strings 25 as they pass around said hub as a bridge.

Referring to Figs. 5, and 6, each of the respective members 18' of the felly 18 is provided centrally with a vertically extending aperture 26, inclosing a pin 26', while into said aperture leads a horizontally extending aperture in certain of said members 27 from the face 19, said last-named aperture being in a line tangential to the periphery of the central member 22 for a purpose hereinafter described. Furthermore, extending diagonally into said felly members at the level of the aperture 27 is a second aperture 28 from which a screw 29 extends inwardly, and about which is firmly secured one end of one of the music cords or strings 25. Also extending transversely through certain of the felly members is an aperture 32, narrowed at its inner end 33, and adapted to frictionally receive and bind the adjacent end through a tuning pin or key 34, preferably provided with a slot 35 for use in adjusting the same with a screw-driver, after which said pin is driven into the narrowed portion of said aperture. Extending from and tangential to the aperture 26, and at the height of the aperture 27, is another aperture 36, at its opposite end opening into the aperture 32, thus forming a channel through which a string, entering the felly, after having passed from the anchoring screw 29 and throughout its particular course, passes to and around the pin 34.

Each of the strings of the device is preferably positioned and run substantially as shown in Figs. 5 and 6, starting at the screw 29 and passing to and around the bridge 22 in one of the grooves 23, forming sections A and B of the string, after which it passes into a second felly section through the apertures 37 and around the adjacent pin 38, thence to and around said bridge in the same or another groove, and to and around the pin 39 through the adjacent grooves 37, forming the sections C and D. From this point the string passes to and around the said bridge in one of the said grooves, forming the sections E and F, thence entering the channel formed by the connected grooves 27, 26 and 36, passing around the pin 26', and thence to and around the tensioning pin 34, which latter is then rotated to adjust the tension upon the string to give to it a definite vibratory period or tone, said pin after tuning being driven firmly into place as above described and a plug 40 inserted to cover and protect the same. While this is the preferred arrangement of each of the strings, there are many ways in which they can be strung, and while the preferred number is four, as shown, this may be increased or decreased as desired. Furthermore, the exact arrangement of the strings in the grooves of the bridge is not essential, the arrangement being such that no two string sections in passing each other either directly contact, or contact intermittently as they are individually or simultaneously set into vibration, this vibration being transmitted to the individual strings mechanically from a vibratory record upon the turntable through the felly sections or string supports, and through the medium of the upper and lower walls of the device and the hub, or to the strings directly from the walls of the device, which are set into vibration by the record adjacent to one of them. Also, it is not essentially necessary to provide a bridge such as that shown, as other types may be substituted, or entirely omitted, the alteration or absence of the bridge tending only to effect the tone or pitch of the strings. Furthermore, while not thoroughly understood at this time, it has been found to be distinctly advantageous to secure upon the upper surface of the wall 13, a central annular ring or disk 42 of fibrous material, such as felt, and an annular ring 43 of the same material adjacent to the peripheral portion of said wall, said fibrous members being arranged to support the central and peripheral portions respectively of a record upon the device, while the portion of the surface of said wall opposite to the grooved portion of said record is directly exposed to, and set into vibration by, the latter, though separated therefrom, except for the felt sections. In this manner a second resonance

chamber is obtained between the record disk and the upper wall of the casing of the device proper, and the effect of the presence of this chamber upon the reproduced sound is clearly noticeable and quite advantageous.

While it has been found preferable to make this device as hereinbefore described, that is, practically entirely of wood, parts thereof may be constructed of metal, as for instance either the hub 10 or lining 21 may be of such material though at least the other portion of the bridge must be of wood or similar material, and in no case to obtain the best results must metal in the frame be allowed to contact with the strings. Furthermore, many changes in the details of construction may be made with varying influence upon the audible effect produced. And, too, while particularly adapted for use in conjunction with sound reproducing machines, the principle in its broadest form may be readily adapted to use in connection with an unlimited number of sound producing instruments, either permanently connected thereto, or brought into coöperation therewith as described. Furthermore, when the material of the casing of the improved record support is composed of wood, or other fibrous material, the same may be treated or coated, either partially or entirely, with a solution containing either or both resin and turpentine, this combination forming a material possessing the greatest known resonance, and its presence increasing the resonance of the material of the casing.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States is:

1. A resonant record support for sound reproducing machines, comprising a tensioned vibratory member operative to be set into vibration by a record adjacent thereto.

2. A resonant record support for sound reproducing machines, comprising a tensioned vibratory member operative to be set into vibration by physical connection with a record upon the support.

3. A resonant record support for sound reproducing machines, comprising a hollow casing, and a tuned string mounted therein, and operative to be set into vibration by a record disk through the medium of said casing.

4. A record support, comprising spaced walls one of which is adapted to support a record, a rim inclosing the space between said walls, and a tuned string supported by said rim and operative to vibrate in sympathy with certain periods of vibration of said record, when the same is in coöperation with a stylus.

5. A record support, comprising spaced resonant walls one of which is adapted to support a record, a rim including the space between said walls, a bridge within said

inclosure, and a vibratory member supported by said rim and in contact with said bridge, and operative to vibrate in sympathy with certain periods of vibration of said record, when the same is in coöperation with a stylus.

6. A record support, comprising spaced walls inclosing a resonant chamber and one of which is adapted to support a record, and spaced fibrous members carried by said wall and normally inclosing a resonant air space between said wall and said record.

7. A record support, comprising spaced walls, a felly between and inclosing the space between said walls, a rim connecting the peripheral portions of said walls and a hub extending between and maintaining said walls in spaced relation.

8. A record support, comprising spaced walls, a felly between and inclosing the space between said walls, a rim connecting the peripheral portions of said walls and a hub extending between and maintaining said walls in spaced relation, one of said walls being perforated to permit sound waves to pass therethrough.

9. A record support, comprising spaced walls, a felly inclosing the space between said walls, a hub extending between and maintaining said walls in spaced relation, and a tensioned vibratory member supported by said felly and coöperating with said hub as a bridge.

10. A record support, comprising a resonant wall, a rim, a hub, and a turned vibratory member supported by said rim and hub and operative to vibrate in sympathy with predetermined neighboring vibrations.

11. A record support, comprising a resonant wall, a rim, a hub, and a plurality of tuned vibratory members supported by said rim and hub and operative to vibrate in sympathy with definite predetermined vibrations of said wall.

12. A record support, comprising a vibratory member, a support therefor, and means to vary the natural period of vibration thereof.

13. A record support, comprising a resilient, tensioned vibratory member, a support therefor, and means to vary the tension and alter the natural period of vibration thereof.

14. A record support, comprising a felly, a tensioned string, and a hub, said string extending from said felly, to and around said hub as a bridge and thence to said felly.

15. A record support, comprising a felly, a tensioned string, a hub, said string extending from said felly, to and around said hub as a bridge and thence to said felly, and means carried by said felly to alter the natural period of vibration of said string.

16. A record support, comprising a felly,

a tensioned string, a hub, and means carried by said felly to vary the tension upon said string, said string extending from a point on said felly adjacent to said means around
 5 said hub to a second portion of said felly, thence to and around said hub to a third portion of said felly, and thence to and around said hub to the said tensioning means adjacent to the starting point on said felly.

10 17. A resonant body, comprising a tensioned vibratory member, means to support the same, and means substantially inclosed by said first means to tension said member, and coöperating with said first means at
 15 both ends.

18. A record support, comprising spaced walls one of which is adapted to support a record, a rim inclosing the space between said walls, and a vibratory member supported by said rim and operative to vibrate
 20 in sympathy with certain periods of vibration of said record, when the same is in coöperation with a stylus.

19. A record support, comprising spaced
 25 resonant walls one of which is adapted to support a record, a rim inclosing the space between said walls, a bridge within said inclosure, and a tensioned vibratory member supported by said rim and in contact with
 30 said bridge, and operative to vibrate in sympathy with certain periods of vibration of

said record, when the same is in coöperation with a stylus.

20. A record support for sound reproducing machines, comprising a disk, and a tensioned vibratory member carried by said disk operative to be set into vibration by reproducing sound from a record upon said support. 35

21. The combination of a record support
 40 for sound reproducing machines, with a tensioned vibratory member carried by said support and operative to be set into vibration by the vibration of a record upon said support. 45

22. A record support for sound reproducing machines, comprising a frame, and a tuned resilient member carried by said frame and operative to be set into vibration by a record upon said support. 50

23. A record support for sound reproducing machines, comprising a frame, and a resilient member carried by said frame and operative to be set into vibration by physical connection with a record adapted to vibrate upon said support. 55

In witness whereof, I have hereunto set my hand this thirteenth day of July, 1915.

JAMES H. COLLINS.

Witnesses:

MARY B. O'DONNELL,

MARIE V. BURNS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

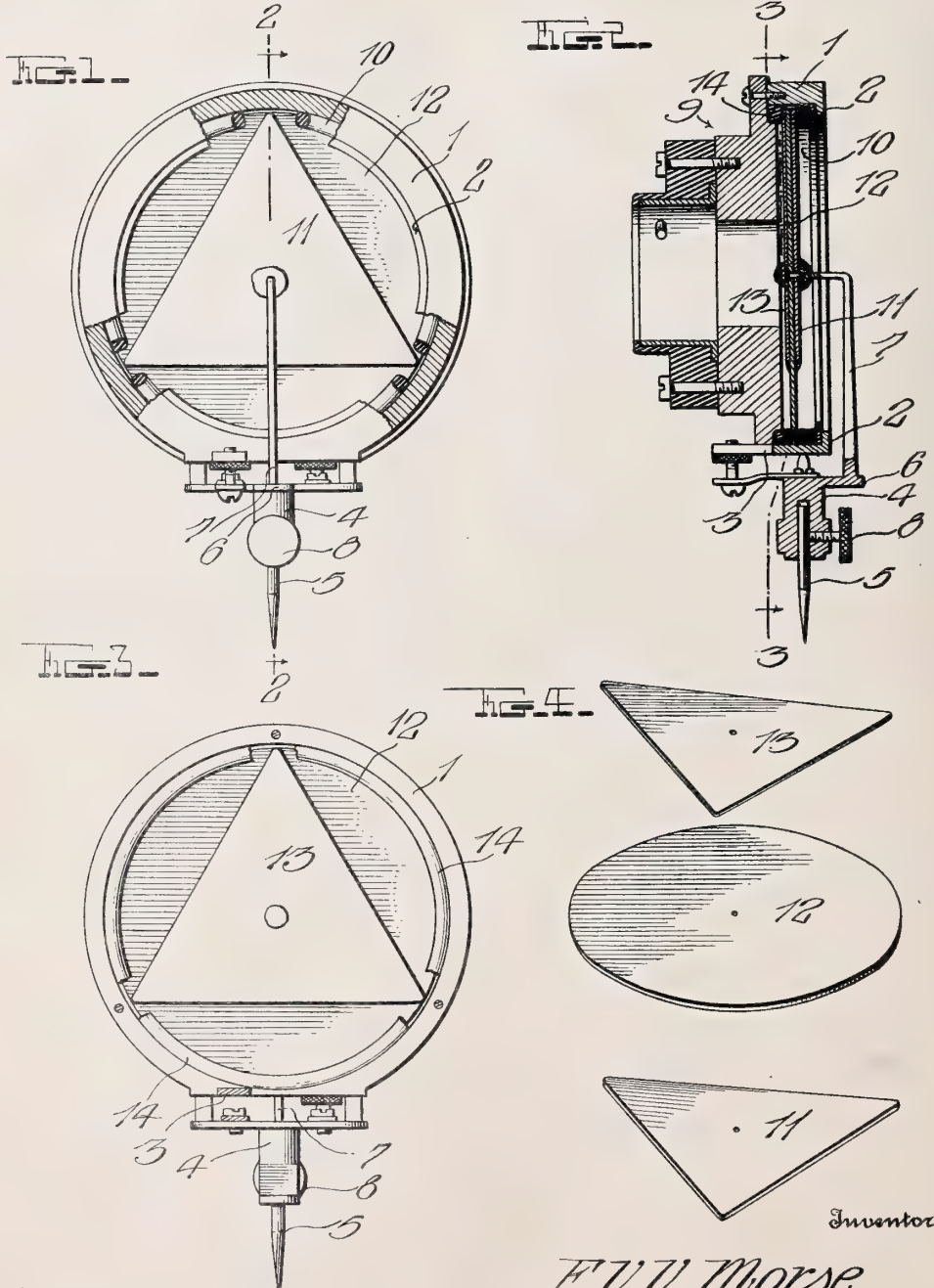
DIAPHRAMS FOR PHONOGRAPHS & TALKING MACHINES.

1,194,056 ----- F. Van Vleck Morse.
Patented Aug. 8, 1916.
Filed Feb. 15, 1915.

F. VAN V. MORSE.
 DIAPHRAGM FOR PHONOGRAPHS AND TALKING MACHINES.
 APPLICATION FILED FEB. 15, 1915.

1,194,056.

Patented Aug. 8, 1916.



Witnesses
H. Woodard

F. V. V. Morse

By *A. B. Wilson & Co*
 Attorneys

UNITED STATES PATENT OFFICE.

FRANK VAN VLECK MORSE, OF MINNEAPOLIS, MINNESOTA.

DIAPHRAGM FOR PHONOGRAPHS AND TALKING-MACHINES.

1,194,056.

Specification of Letters Patent.

Patented Aug. 8, 1916.

Application filed February 15, 1915. Serial No. 8,246.

To all whom it may concern:

Be it known that I, FRANK V. V. MORSE, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Diaphragms for Phonographs and Talking-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates generically to phonographic recorders or reproducers but more particularly to diaphragms used in connection therewith.

One object of my invention is to provide a diaphragm that will respond with perfect clearness to the most delicate vibration irrespective of atmospheric changes and will accurately record and reproduce both the high and low tones and the included range with equal effect.

Another and further object of my invention resides in providing a diaphragm that will eliminate almost completely discordant and scratchy sounds now present in phonographic reproductions.

Another and still further object of this invention is to provide a diaphragm so mounted as to greatly augment the amplitude of its vibration.

Another and still further object of my invention is to greatly reduce the cost of diaphragm manufacture.

With these and other objects in view my invention consists of certain novel details of construction, combination and arrangement of parts to be more particularly hereinafter set forth and claimed.

In the accompanying drawings in which corresponding parts are indicated by similar reference numerals; Figure 1 is a front elevation partly in section of my improved reproducer, certain elements being broken away to illustrate the manner of mounting one of the planes; Fig. 2 is a transverse vertical section taken on the line 2—2 of Fig. 1; Fig. 3 is a vertical section taken on the line 3—3 of Fig. 2; Fig. 4 is a perspective view of the three elements comprising the diaphragm, said elements being illustrated in separated position.

It is a well known fact by those skilled in this particular art that a perfect reproduction may be secured, if it is possible to obtain a diaphragm having sufficient flexibility and stiffness to enable the same under a given impulse to bow uniformly from its medial line. The diaphragms now in use have up to the present failed to entirely overcome the scratching and discordant noises associated with phonographic reproduction because the annular diaphragms employed are more flexible at their central portion than near their periphery and consequently fail to bow uniformly under a given impulse. In other words, nodal points are produced in the length of the diaphragm. Various efforts have been made by constructing diaphragms of several plies of the same or different material or in forming the diaphragm with a graduated thickness from its peripheral to its central portion, the object being to increase the amplitude of vibration of the diaphragm by strengthening the latter and causing the same to bow uniformly from its medial line, which would thus not only increase the quality of the tone but would also overcome the scratchy noise produced by the needle in passing over the record.

I have discovered that if two triangular planes of mica of unequal thickness are arranged in coincident relation on opposite sides of an annular celluloid disk which is mounted at its periphery in the diaphragm holder and said triangular planes of mica secured at their vertices to the diaphragm holder and the three elements united at their central portion to a stylus or reproducing rod that the tones produced by the reproducer will be much clearer and sweeter than those obtained by reproducers using the ordinary one ply mica diaphragm and that moreover there will be absolutely no scratchy noises accompanying the reproduction. This improved reproduction is caused by the fact the three points at which the mica planes are secured to the diaphragm holder are the nodal points of the diaphragm so that the latter is strengthened at the nodal points as well as at its central portion by reason of the celluloid disk interposed between the mica planes and consequently one impulse given to the reproducing arm or stylus will

cause my improved diaphragm to move bodily or uniformly from its medial line; and further that the amplitude of vibration of the diaphragm will be increased by having the mica planes of unequal thicknesses.

Referring more particularly to the accompanying drawings my invention in its present embodiment consists of an annular diaphragm holder 1, having the flange 2 projecting from one of the peripheral edges thereof. Upon the frame 1 is mounted a bracket 3 which supports a socket 4 adapted to receive a stylus needle 5. Projecting laterally from the central portion of the bracket 3 is an arm 6 secured to which is one end of the stylus or reproducing arm 7, the other end of which is connected to the diaphragm in a manner hereinafter to be stated. A suitable set screw 8 passing through the socket 4 enables the stylus needle 5 to be securely held in place. A sounding box 9 is secured by suitable fastening elements on the diaphragm holder 1 as clearly shown in Fig. 2.

As all of the above is well known to the art, no novelty is claimed in connection with the same it being described simply to enable the application of my invention to be more readily presented.

Coming now to the important feature of my invention to wit: the diaphragm, it will be apparent that the latter consists of the following elements mounted in the manner hereinafter to be stated: Disposed upon the flange 2 is a rubber gasket 10. Supported upon the gasket 10 at its vertices is a triangular plane of mica 11 and seated upon the mica plane 11 is an annular celluloid disk 12. Resting upon the disk 12 is another mica plane 13 the outlines of which are preferably coincident with the mica plane on the opposite sides of the celluloid disk 12, said plane 13 being slightly thinner than the plane 11 for a purpose to be described. To support the mica plane 13 in its proper position a rubber gasket 14 is interposed between the sound box 9 and the vertices of the mica plane 13. A fastening element is passed through the central portion of the three planes composing the diaphragm which element is connected to the free end of the reproducing arm 7. A drop of wax about each end of the element passing through the three planes retains said element in place as will be readily understood without further description.

It is to be noted that the mica planes 11 and 13 are not secured to the celluloid disk 12 except at their vertices and at their centers, and that they are at all times maintained in perfect planes by reason of their not being cemented, as is usually done. They are therefore very sensitive to sound vibrations and work independently of each other, the thicker plane 11 responding to vibrations which the thinner one 13 would not,

and vice versa. As mica is a material more sensitive to sound vibrations than celluloid, the celluloid disk 12 is placed between the two mica planes 11 and 13 to retard the vibrations of the latter, as will be readily understood without further description.

From the foregoing construction it will be obvious that owing to the three point connection of the mica planes shown and described as well as the interposed annular disk of celluloid a three ply diaphragm is obtained having such thickness as will enable it to bow uniformly from its medial line under a single impulse given by the stylus arm, thus giving an amplitude for the diaphragm sufficient to overcome all scratchy and discordant sounds produced by the stylus needle passing over the record and a reproduction free from all defects. Another advantage accruing from my invention is in constructing the same, mica of inferior quality may be employed, whereas the diaphragms now on the market require an exceptional quality of mica. This is an important feature as it greatly reduces the cost of manufacturing diaphragms under consideration.

Although by the foregoing I have set forth certain elements as best adapted to perform the functions allotted to them, nevertheless it is to be understood that various minor changes in form, proportion, etc., may be resorted to within the scope of the appended claims without departing from or sacrificing any of the principles of the invention.

I claim as my invention:

1. A diaphragm for phonographic reproducers comprising a circular disk of a material sensitive to sound vibrations, and two triangular planes of unequal thicknesses of a material more sensitive to sound vibrations than the material from which said disk is made, said planes being arranged on opposite sides of said disk.

2. A diaphragm for phonographic reproducers comprising a circular disk of a material sensitive to sound vibrations, and two triangular planes of unequal thicknesses of a material more sensitive to sound vibrations than the material from which said disk is made, said planes working independently on opposite sides of said disk.

3. A diaphragm for phonographic reproducers comprising a circular disk of a material sensitive to sound vibrations, and two triangular planes of unequal thicknesses of a material more sensitive to sound vibrations than the material from which said disk is made, said planes being arranged on opposite sides of said disk and being secured to the latter only at their vertices and at their centers, whereby said planes respond independently to sound vibrations.

4. A diaphragm for phonographic repro-

ducers comprising a circular disk of a material sensitive to sound vibrations, and two triangular planes of unequal thicknesses of a material more sensitive to sound vibrations than the material from which said disk is made, said planes being arranged in coincident relation on opposite sides of said disk and being secured to the latter only at their vertices and at their centers, whereby

said planes respond independently to sound vibrations.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FRANK VAN VLECK MORSE.

Witnesses:

J. S. ANDERSON,

H. M. NEWLAND.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

GRANDPHONE PATENT. 1,194,488.
PHONOGRAPH OR TALKING MACHINE,
#1,194,488-----F. L. Dyer,
Patented-Aug. 15th, 1916.
Filed-February 21st, 1910.

F. L. DYER.
 PHONOGRAPH OR TALKING MACHINE.
 APPLICATION FILED FEB. 21, 1910.

1,194,488.

Patented Aug. 15, 1916.
 2 SHEETS—SHEET 1.

Fig. 1

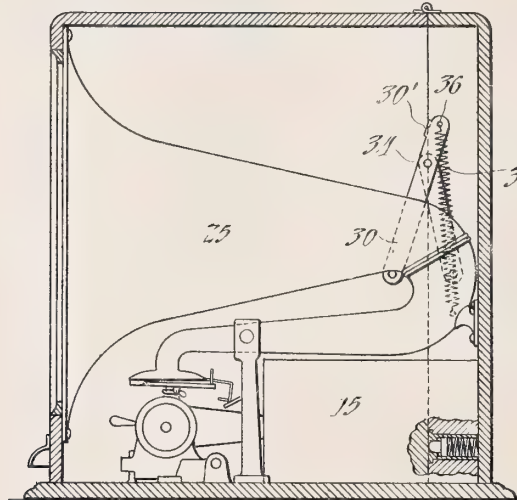
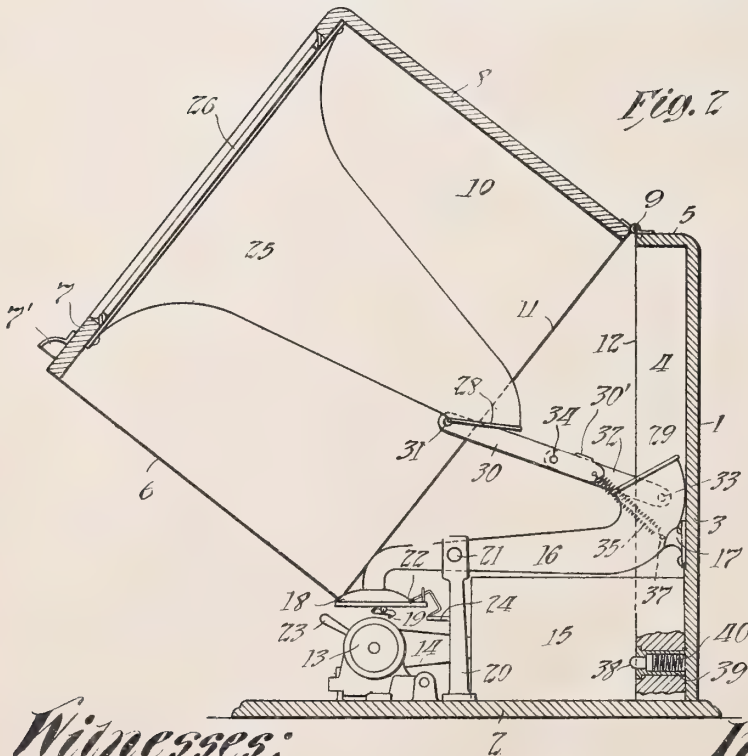


Fig. 2



Witnesses:

Frank D. Lewis
Dyer Smith

Inventor:

Frank L. Dyer

F. L. DYER.
 PHONOGRAPH OR TALKING MACHINE.
 APPLICATION FILED FEB. 21, 1910.

1,194,488.

Patented Aug. 15, 1916.
 2 SHEETS—SHEET 2.

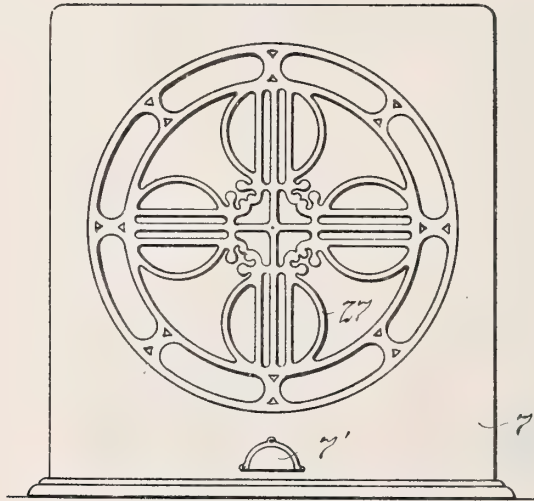


Fig. 3

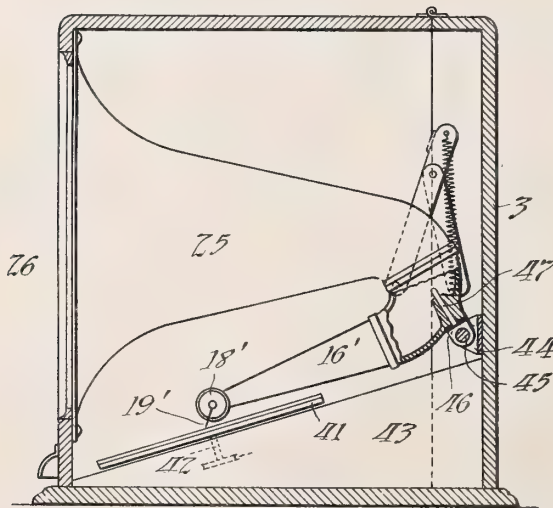


Fig. 4

Witnesses:
 Frank D. Lewis
 Dyer Smith

Inventor:
 Frank L. Dyer

UNITED STATES PATENT OFFICE.

FRANK L. DYER, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH OR TALKING-MACHINE.

1,194,488.

Specification of Letters Patent.

Patented Aug. 15, 1916.

Application filed February 21, 1910. Serial No. 544,972.

To all whom it may concern:

Be it known that I, FRANK L. DYER, a citizen of the United States, and a resident of Montclair, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Phonographs or Talking-Machines, of which the following is a description.

My invention relates to phonographs or talking machines of the type in which the horn or sound amplifying means is inclosed within a cabinet which conceals or partially conceals the same, and my object is to provide a simple and compact device of this character in which a horn or sound conveying means of a length sufficient to give the sound reproduced the desired amplification, is inclosed within a small and compact cabinet. In pursuance of this object, I mount a sound amplifying horn or conveyer within a cover which preferably is hinged to the cabinet containing the phonograph or talking machine, the amplifying horn when the cover is closed making joint with the tone arm or other connection from the sound box, so that a continuous sound passageway is provided from the reproducer to the exit end of the sound conveyer, which preferably is located in the front of the cover. By this means the horn carried by the cover may be forwardly directed above the phonograph or talking machine when the cover is closed, the horn and connections being coiled or bent in such a manner as to give the desired length thereto, while at the same time the record and reproducer are rendered readily accessible for changing records, etc. by merely opening the cover. My invention is equally applicable to phonographs and talking machines of the cylinder and of the disk type.

Other objects of my invention will appear in the following specification and appended claims.

Reference is hereby made to the accompanying drawings forming part of this specification, in which corresponding numer-

als are used to denote like parts, and in which—

Figure 1 represents a vertical cross section through a cabinet having a cover pivoted thereto in closed position, a phonograph of the cylinder type, together with the tone arm, amplifying horn, etc., being shown in elevation contained therein. Fig. 2 is a similar view showing the cover in open or raised position. Fig. 3 represents an end elevation looking from the left in Fig. 1 or Fig. 4; and Fig. 4 is a view corresponding to Fig. 1, showing my invention applied to a talking machine of the disk type.

Referring to the drawings, the cabinet 1 is provided with a base 2, a back 3 and sides, one of which is shown at 4 and which extend only a short distance forwardly. The top is shown at 5 extending forwardly the same distance as the sides. The cover 6 is provided with a front member 7, and top 8 which is pivoted to the top member 5 of cabinet 1 by means of the hinge 9, the cover 6 also having two side members 10 (one shown). When the cover is in closed position, as shown in Figs. 1 and 4, the rear edges 11 of sides 10 of the cover abut forward edges 12 of the sides 4 of the cabinet, which then forms a complete box.

The record-supporting mandrel 13 is supported above base 2 of cabinet 1, the mandrel being adapted to be rotated by belt or other connection 14 from the motor inclosed within casing 15 mounted upon base 2. Tone arm or sound conveying tube 16 in the embodiment of my invention shown in Figs. 1 and 2, is secured at 17 to back member 3 of cabinet 1 and carries sound box 18 which is provided with stylus 19 adapted to track the grooves of a cylindrical record placed upon mandrel 13 and connected to a diaphragm within sound box 18 in the usual manner. As shown, an upright 20 is likewise provided rising from bottom plate 2 of the cabinet, the tone arm 16 being supported thereby, as shown at 21. As shown in Fig. 2, the record upon mandrel 13 may readily

be changed when cover 6 is in its raised position. I have diagrammatically illustrated the structure described and claimed in application of Weber, Serial No. 575,861, filed August 6, 1910, for stopping the mandrel and lifting the floating weight 22 to remove the stylus 19 from the record surface when it is desired to change the record. As illustrated, these two functions are accomplished by moving the pivoted arm 23 which, through a series of levers and linkages, lifts arm 24 extending from the interior of hollow column 20 to lift floating weight 22 at the same time that the mandrel is stopped. This is, however, no part of my invention, and it is not necessary that it be used. I have illustrated the form of phonograph in which the sound box and sound conveying tube connected therewith are stationary, while the mandrel is provided with a longitudinal movement for purposes of feed, but it is obvious that my invention may equally well be applied to a phonograph having a longitudinally immovable mandrel and a sound box which is fed longitudinally of the same. This can be accomplished in a number of known ways. For example, by pivoting tone arm 16 and providing the same with a telescopic connection, the tone arm being then connected to be moved by the feed screw, or by forming tone arm 16 with a right angled extension within which telescopes a sound conveying tube connected directly to sound box 18 in the manner shown in French patent to Desmarest No. 331,087, granted April 9, 1903, or as shown in application of Walter H. Miller, Serial No. 473,001, filed Jan. 18, 1909. In this case the tube 16 would be immovable, while the sound box and its telescoping connection would be connected to the feed screw to be moved longitudinally of the record.

As shown, sound amplifying horn or conveyor 25 is secured within cover 6, the horn 25 being shown as fastened to the front member 7 of the cover. Sound is emitted from horn 25 through opening 26 in the front member 7 of the cabinet, this opening being covered by a suitable lattice or grill as 27, if desired. When the cover is in closed position, the inner end 28 of horn 25 abuts against and makes a tight joint with the upper end 29 of tone arm 16. Preferably, if cover 6 is hinged at the top to cabinet 1 at approximately the point indicated, the abutting ends 28 and 29 of horn 25 and tube 16 are given an inclination similar to that shown, since if such an angle is used the horn and tube come together and separate easily.

Any suitable means may be provided for holding the cover in open position, and if desired, means are also provided for aiding the opening of the cover against gravity. I

have illustrated suitable means of this character in the drawings, in which an arm 30 is pivoted as shown at 31 to each side wall 10 of the cover and an arm 32 is pivoted at 33 to each side wall 4 of the cabinet. Arms 32 are pivotally connected to arms 30 as shown at 34, and preferably a spiral spring 35 is secured to each arm 30, as illustrated at 36, and at its other end to each side wall 4 of cabinet 1 as shown at 37. This construction constitutes a toggle joint which is straightened out by the opening of the cover, springs 35 which are under tension when the cover is in its closed position aiding the straightening out of the toggle and accordingly aiding the opening of the cover 6, or because of their tension, tending to open the same. Arms 30 are provided with lugs 30' extending at right angles to the upper surface of the same, the function of these lugs being to contact the upper surfaces of arms 32 when the toggles are straightened out to limit the movement of the toggles and hold the cover 6 in its open position. I also prefer to provide means to prevent shock upon the closing of the cover. Suitable means are shown in which a slidable member 38 constituting in effect a small piston is mounted to slide horizontally within a small cylinder 39 provided in each side wall 4 of cabinet 1, pistons 38 being spring pressed by springs 40 within cylinders 39 so that members 38 normally project slightly beyond the edges 12 of side members 4. When cover 6 is closed, edges 11 of sides 10 contact members 38, the backward movement of which is retarded by springs 40. The arrangement is such that the cover is held closed by its own weight. A small handle 7' may be provided, if desired, on the front of the cover for lifting the same when it is desired to open the cabinet.

Referring to Fig. 4, the preferred construction for reproducing from disk records is here shown. The tone arm 16' carries sound box 18' provided with stylus 19' which is adapted to track a disk sound record placed upon turntable 41, which is adapted to be rotated by spindle 42 which is connected in any desired manner with the motor which is contained within casing 43. I prefer to arrange the turntable and the upper surface of the casing 43 so that they make an angle to the horizontal and extend in the same general direction as the lowermost element of the horn 25. By the term element as herein used, I refer to a line formed at the intersection of the outer surface of the horn and a plane passing through the axis of the latter. The device is rendered more compact by this means, since if tone arm 16' were raised to the horizontal position, horn 25 would likewise have to be raised somewhat, and furthermore, if

arm 16' were raised to the horizontal position, a much sharper bend would be formed between tone arm 16' and horn 25. By locating the turntable 41 on an incline as shown, the additional advantage is secured that the feeding of the stylus 19' toward the center of the disk is aided by gravity, and likewise more room is provided for the motor. For raising the stylus from the record surface and for permitting the stylus to move across the record surface in feeding, I have shown a bracket 44 secured to the back member 3 of cabinet 1, which bracket carries a horizontal pin 45 upon which block 46 carrying pin 47 is rotatably mounted. Pin 47 is inserted within a socket formed therefor in the elbow portion of tone arm 16'. The tone arm swings pivotally upon pin 47 in traveling across the record and upon pin 45 when the stylus 19' is lifted from the record surface. It is obvious that my invention is equally applicable whether the stylus is fed from the record or by any of the well known forms of mechanical feed. It is also obvious that cover 6 might be hinged to cabinet 1 to open to the side instead of upwardly, as shown in the figures. Thus, hinges similar to 9 might be secured to one side 10 of the cover and one side 4 of the cabinet at the edge 11 of the side member 10 of the cover and the edge 12 of the side 4 of the cabinet, so that the cover may be opened to the side to render the mechanism accessible. In this case, the adjacent ends of horn 25 and tone arm 16 would meet in a horizontal plane instead of in an inclined plane, as shown.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. In a phonograph or talking machine, the combination of a cabinet having a base portion and a portion extending upwardly from the rear of said base portion, a cover for said cabinet having a front, a top, and sides, the said cover being hinged about a substantially horizontal axis to the upwardly extending portion and adapted when closed to contact the top of the base portion at the lower edges of its front and sides, a rotatable record support and operating means therefor supported on the top of said base portion, a reproducer carried by said cabinet and adapted to operate upon a record carried by said support, and a sound conveyer carried by said cover and connected to said reproducer by a separable joint substantially vertically below the hinged connection of the cabinet and cover when the cover is closed, substantially as described.

2. In a phonograph or talking machine, the combination of a cabinet, a cover hingedly connected with said cabinet about a substantially horizontal axis, a record sup-

port, reproducer and sound conveying tube connected with said reproducer carried by said cabinet, and a forwardly extending amplifying sound conveyer carried by said cover, said tube and conveyer being provided with ends arranged to abut substantially vertically below said hinged connection when the cover is closed and form a joint inclined downwardly toward the front of the cabinet, substantially as described.

3. In a phonograph or talking machine, the combination of a cabinet, a cover hingedly connected to the top thereof about a substantially horizontal axis, a record support carried by said cabinet, a sound conveyer comprising a section supported by said cabinet and provided at one end with a reproducer adapted to operate upon a record carried by said support, and a forwardly extending amplifying section carried by said cover and adapted to abut against the other end of said first section when the cover is closed to form therewith substantially vertically below said hinged connection a joint inclined downwardly toward the front of the cabinet, substantially as described.

4. In a phonograph or talking machine, the combination of a cabinet, a cover hingedly connected to the top thereof about a substantially horizontal axis and having a wall forming the front of the cabinet when the cover is closed, a record support carried by said cabinet, a sound conveyer comprising a forwardly extending section carried by said cabinet and provided at its forward end with a reproducer adapted to operate upon a record carried by said support, and a forwardly extending amplifying section carried by said cover, said amplifying section being adapted to abut at its rear end against the rear end of said first section when the cover is closed to form therewith substantially vertically below said hinged connection a joint inclined downwardly toward the front of the cabinet, substantially as described.

5. In a phonograph or talking machine, the combination of a cabinet, a cover hingedly connected with said cabinet about a substantially horizontal axis, a record support, reproducer and sound conveying tube connected with said reproducer carried by said cabinet, and a forwardly extending amplifying sound conveyer carried by said cover, said tube and conveyer being provided with ends arranged to abut substantially vertically below said hinged connection when the cover is closed, substantially as described.

6. In a phonograph or talking machine, the combination of a cabinet, a cover hingedly connected to said cabinet, a record support, a reproducer adapted to operate upon a record carried by said support, and

a sound conveyer carried by said cover and connected to said reproducer when the cover is closed by a separable joint substantially vertically below the hinged connection of the cabinet and cover, substantially as described.

7. In a phonograph or talking machine, the combination of a record support, a reproducer adapted to operate upon a record carried by said support, and a sound conveyer mounted for pivotal movement to and from operative position about a substantially

horizontal axis, said sound conveyer when in operative position being connected to said reproducer by a separable joint substantially vertically below the pivotal mounting of the sound conveyer, substantially as described.

This specification signed and witnessed this 18th day of February, 1910.

FRANK L. DYER.

Witnesses:

DYER SMITH,

JOHN M. CANFIELD.

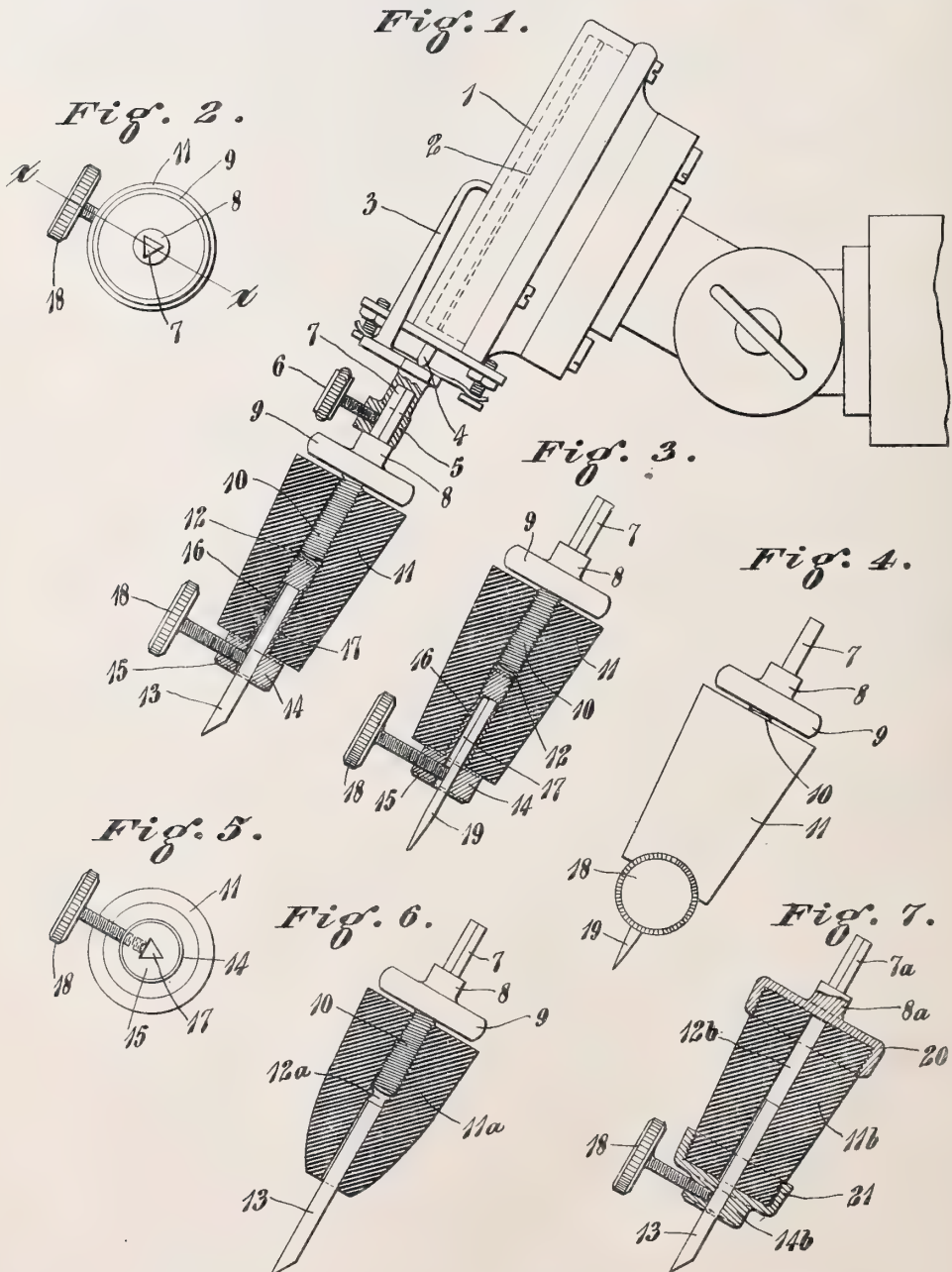
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

ACOUSTIC NEEDLE MOUNTING,
#1,194,573----W.A.Tangeman,
Patented-August 15th, 1916.
Filed-October 15th, 1914.

W. A. TANGEMAN.
ACOUSTIC NEEDLE MOUNTING.
APPLICATION FILED OCT. 15, 1914.

1,194,573.

Patented Aug. 15, 1916.



Witnesses:

Clarence Forder
Irene Parker

Inventor
William A. Tangeman
By James V. Rousey
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM A. TANGEMAN, OF WYOMING, OHIO.

ACOUSTIC-NEEDLE MOUNTING.

1,194,573.

Specification of Letters Patent.

Patented Aug. 15, 1916.

Application filed October 15, 1914. Serial No. 866,738.

To all whom it may concern:

Be it known that I, WILLIAM A. TANGEMAN, a citizen of the United States, and a resident of Wyoming, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Acoustic-Needle Mountings, of which the following is a specification.

My invention relates to sound recording and reproducing machines; and its object is the provision of means for improving the quality of the sound reproduced by such instruments.

My invention consists in the parts and in the details of construction and arrangement of parts as will hereinafter be more fully described and claimed.

In the drawing: Figure 1 is a side elevation of a sound box with a needle mounted thereon by means of my invention, parts involved in my invention being shown in vertical section on a line corresponding to the line $x-x$ of Fig. 2, the needle shown being one of triangular cross section, such as is usually made of bamboo or some such vegetable fiber; Fig. 2 is a detail plan view of the mounting shown in Fig. 1; Fig. 3 is a sectional view similar to that shown in Fig. 1, but showing the mounting carrying a needle of circular cross section, such as is usually made of metal; Fig. 4 is an elevation of the mounting, taken at right angles to that of Figs. 1 and 3, or looking along the line $x-x$ of Fig. 2; Fig. 5 is an inverted plan view of the mounting with the needle removed; Fig. 6 is a sectional view corresponding to that shown in Figs. 1 and 3, but illustrating a modification of my invention in which the needle is carried directly in the cushioning material; and Fig. 7 is a vertical section similar to those of the preceding figures, but showing another modification in which the base and holder extend out around the respective ends of the cushioning body.

For the purpose of illustrating the use of my invention, I have shown, in the drawing, a sound box 1 with a diaphragm 2 to which is attached one end of the stylus lever 3, pivoted upon lugs 4 on the side of the sound box, and having in its opposite end a socket 5 into which enters a set screw 6, which

socket usually directly receives the stylus or needle that is to engage with the record.

The form of mechanism here shown is specifically intended for use with records having lateral undulations, but as will be discerned from the following description, my invention is applicable also in connection with records having vertical undulations or those of other forms, and may be applied to reproducing mechanisms of varying constructions and types, the one herein shown being selected merely to illustrate the principle of the invention.

Reproduction of a sound originally recorded, ordinarily makes manifest some imperfections in the record itself, and also a mechanical action upon the diaphragm caused by friction of the stylus or needle against the record, due largely to the inelasticity of the needle or stylus mounting. Indeed, such friction of the needle or stylus against the material of the record is manifest aside from the sounds produced by the diaphragm, and becomes most objectionable during the more quiet periods of the rendition of the record.

Indiscriminately muffling the sound of the instrument muffles the harmonic or musical sound vibrations which are intended to result exactly from and to reproduce exactly the undulations of the sound groove, as well as the undesirable or inharmonic sounds. The substitution of soft materials, such as fiber, for the purpose of absorbing sounds has, owing to inelasticity, failed to reproduce the true undulations of the record when it has been made so absorbent of sound as to materially modify the objectionable noises transmitted from the record as above described.

For reproducing all classes of sounds, including desired faint ones, overtones and high notes, it is highly desirable, in many instances, that a stylus or needle be used which will have very little sound absorbent properties, of such material as steel or sapphire.

Attempts have been made to prevent the objectionable noises by interposing a cushioning body between the stylus or needle and the stylus lever. Such efforts heretofore have failed to accomplish the object sought by the present invention either in be-

ing too inelastic and too absorbent of the sound, with the same objectionable results as are frequently experienced with the sound-absorbent needle or stylus; or in being not sufficiently absorbent to the sound, with the result that most of the objectionable sounds are transmitted.

In my invention I have provided a cushioning material between the needle or stylus and the stylus lever, of such properties and so disposed that I am enabled to successfully prevent the production of the noises without detracting from the desirable effects of the reproduction.

So far as I am able to determine, the success of my invention is due to the use of cushioning material, highly elastic, yet readily responsive to the undulations of the record, in combination with a proper disposition of such material to enable it to properly perform its function by virtue of the inherent properties of the material.

A material answering to the above description, and most readily suggested, is rubber. The degree of vulcanization of the rubber may be varied to suit the requirements, but such variation will ordinarily be within a range such that the degree of vulcanization may be described as resembling that of rubber ordinarily used for pencil erasers. The possibility of accurately governing the degree of hardness and elasticity of rubber enables me to provide a cushioning material to be used under any conditions which may be required to be met, as shown by experience with different sounds to be reproduced, or with records of different properties, or with different reproducing instruments.

Not only do I employ material having the descriptive properties above set forth, but I preferably provide the body of cushioning material of bulk that is large relative to that of the needle or stylus, as well as to that of the stylus lever and other moving parts between the needle and the diaphragm. I also while giving the cushioning body ample bulk, preferably leave it free exteriorly from any casing or other surrounding part of the mounting, associating with the cushioning material only such parts as are required to attach the material to the stylus or needle at one end and to the stylus lever at the other end, and preferably attaching these parts by extending them into the interior of the cushioning body rather than extending them around the exterior thereof. Thus, as shown in Figs. 1 to 5, inclusive, a shank 7 of cross section to fit the socket 5 has a hub 8 providing a shoulder abutting the end of the stylus lever 3 outside the socket 5, succeeded by a flange 9 of considerable diameter, past which is a threaded stud 10. The cushioning body 11, of material of the nature here-

inbefore described, is, as here shown, preferably of elongated moderately frusto-conical shape, and has an opening 12 of circular cross section through its inside from one end to the other. This opening 12 receives the threaded stud 10, so that the larger end of the body 11 is presented up toward the stylus lever 3, the threaded stud 10 cutting threads in the walls of the opening 12 so that the body 11 is screwed onto the above described base in which the stud 10 is comprised, and may be brought up as far thereon as may be desired. The flange 9, with its considerable diameter, affords means for holding the base while screwing the body 11 thereon.

The stylus or needle 13 is held in a holder 14 comprising a lower enlarged head 15 and a threaded stud 16 which enters the lower end of the opening 12, cutting threads in the walls of the opening 12, and which may thus be drawn as far up in the body 11 as may be desired. Extending longitudinally of this holder 14 through the head 15 and some distance up in the interior of the stud 16 is a socket 17, which is made triangular in cross section to receive needles like the needle 13, and a set screw 18 projects through one side of the head into this socket to clamp the needle. Such a socket will also hold needles of circular cross section, such as the needle 19 shown in Figs. 3 and 4.

The behavior of the cushioning body 11 will be largely influenced by the extent to which the studs 10 and 16 of the base and holder, respectively, are inserted into the central opening 12. If they are inserted so far that they meet, the action of the mounting will be more like the solid metallic mounting that would be provided by inserting the needle 13 directly into the stylus lever 3, although of course still greatly influenced by the material of the cushioning body 11, because this body is instrumental in holding the two studs together and thereby makes up part of the connection, even though the studs make metallic contact. As the studs 10 and 16 are separated by screwing one or the other or both of them out of the cushioning body, the relative influence of the material of the cushioning body will increase. From the foregoing it will be seen that I add this ability of making mechanical adjustment to that of governing the hardness of the rubber or other material which may be found suitable.

The provision of means to refine the reproduction of sounds is far more greatly a matter of practice than of theory. So much is it a matter of that nature that apparent similarity of materials are more often deceptive than not, and the least variation of hardness or elasticity may be very significant, as may also the least variation of disposition of the material in the structure of

the mounting. Therefore, by providing some material susceptible of great variation in its properties, and at the same time liberally disposing of such material, I am enabled to adjust the hereinbefore described details with great precision and secure accordingly accurate results.

In the modification shown in Fig. 6, the base is like that shown in the preceding figures and above described, but the body of cushioning material 11^a has the lower part of its frusto-conical formation of increased taper, which taper is preferably somewhat curved, and the needle or stylus 13 is inserted directly into the lower part of the central opening 12^a of the body 11^a, the threaded stud 10 of the base being screwed into the upper part of this opening as was done in the preceding example. The diameter of the opening 12^a relative to the dimensions of the needle 13 may be varied so that the needle may be made to fit the opening more or less tightly, this detail also having a bearing upon the behavior of the mounting. Also the needle 13 may be inserted to a greater or less distance into the body 11^a or may be made to make contact with the lower end of the stud 10, with results similar to, but less marked, than those of the contact of the studs 10 and 16 in the preceding example. It will also be understood that the lower part of the opening 12^a may be made of proper diameter to receive a needle of small circular cross section, such as that shown in Figs. 3 and 4. The additional tapering of the lower part of the body 11^a, where the needle or stylus is directly inserted, compensates to some extent for the reduction of bulk by the elimination of the holder 14, making the lower end of the cushioning body 11^a more responsive to vibration of the needle than were it not reduced.

In the modification shown in Fig. 7, the base has the shank 7^a and the hub 8^a, but the flange 9 and threaded stud 10 are replaced

by a cup 20 into which is screwed the upper end of the cushioning body 11^b and the holder 14^b has, instead of the threaded stud 16, a cup 21 that screws onto the lower end of the cushioning body 11^b. The body 11^b has a central opening 12^b, but it merely serves to permit the extension of the needle or stylus 13 up from the body of the holder 14^b. I consider this construction less desirable than those shown in Figs. 1 to 6, inclusive, but it embodies my invention, in that the cushioning material enters into the connection of the needle or stylus with the stylus lever and is unconfined throughout a substantial extent of its length exteriorly, allowing the cushioning body to perform its function without undue influence of any surrounding metal or other material more non-absorbent of sound. When the cushioning body is too much confined by a metal casing or similar arrangement, I find that the behavior of the mounting is so much like that of the material of the casing that satisfactory results are not attained.

From the foregoing it will be understood that my invention is capable of considerable modification without departure from the scope and spirit of the following claim:

In an acoustic needle mounting, in combination with a diaphragm and the vibratory lever connected thereto, and a needle or stylus, a hollow cushioning body composed of flexible rubber making up a connection between the lever inserted in one end of said body and the needle or stylus inserted in the other end thereof, said body being tapered toward its free end and being unconfined throughout its length, and its upper end also being unconfined and spaced apart from its mounting and free to yield naturally, substantially as set forth and for the purposes specified.

WILLIAM A. TANGEMAN.

Witnesses:

JAMES N. RAMSEY,
CLARENCE PERDEW.

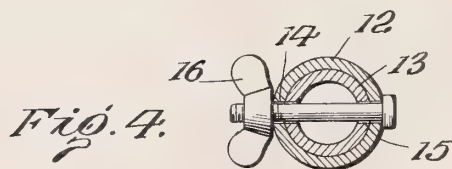
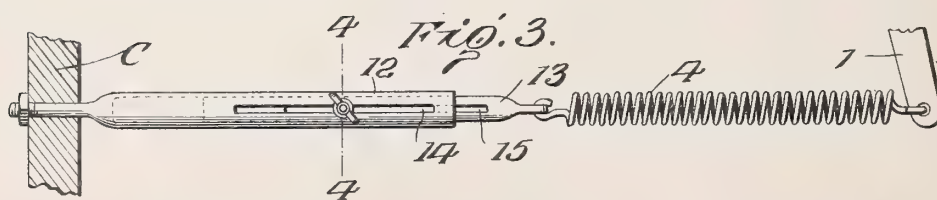
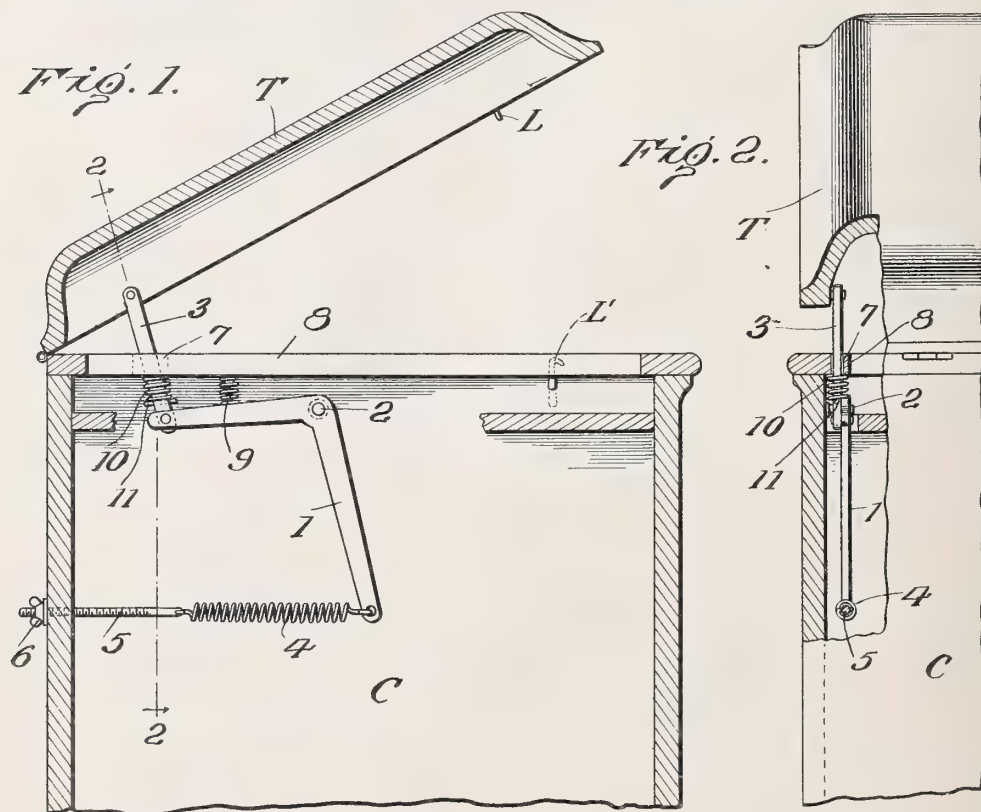
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

COUNTERBALANCE FOR HINGED COVERS,
#1,194,708-----D. T. Buckwalter,
Patented-Aug. 15th, 1916.
Filed-May 17th, 1915.

D. T. BUCKWALTER.
COUNTERBALANCE FOR HINGED COVERS.
APPLICATION FILED MAY 17, 1915.

1,194,708.

Patented Aug. 15, 1916.



Witnesses

W. Abramson

C. C. C. C.

Inventor
D. T. Buckwalter

By *A. B. Wilson & Co.*

Attorneys

UNITED STATES PATENT OFFICE.

DANIEL THEODORE BUCKWALTER, OF ROYERSFORD, PENNSYLVANIA.

COUNTERBALANCE FOR HINGED COVERS.

1,194,708.

Specification of Letters Patent.

Patented Aug. 15, 1916.

Application filed May 17, 1915. Serial No. 28,694.

To all whom it may concern:

Be it known that I, DANIEL THEODORE BUCKWALTER, a citizen of the United States, residing at Royersford, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in Counterbalances for Hinged Covers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in counter-balances for hinged covers or lids.

The object of the invention is to provide a simple and efficient device of this character to assist in raising and lowering heavy lids or covers on victrolas, refrigerators, trunks and the like and prevent all danger of dropping the cover.

Another object is to provide a counter-balance of this character which when applied will cause the lid to remain in open position after being raised without danger of its dropping down, and it may be easily lowered by the pressure exerted by a single finger without any holding effect being exerted.

With these and other objects in view, the invention consists of certain novel features of construction, and the combination and arrangement of parts as will be more fully described and claimed.

In the accompanying drawings: Figure 1 represents a central vertical section through the upper portion of a cabinet showing this improved raising and lowering device applied; Fig. 2 is a rear elevation with parts broken out of a portion of said cabinet showing the lid in raised position, taken on the line 2—2 of Fig. 1; Fig. 3 is a side elevation showing a slightly modified form of the invention; Fig. 4 is a transverse section taken on the line 4—4 of Fig. 3.

In the embodiment illustrated this improved counter-balance device is shown applied to a victrola cabinet, and in Figs. 1 and 2 comprises an angular lever 1 fulcrumed at its angle to the inner face of one side of the cabinet C as shown at 2 and having a link 3 pivoted to the free end of one arm thereof and secured at its other end to the lid T adjacent its hinged side. To

the free end of the other arm of this lever is secured a coiled spring 4. This coiled spring 4 is connected at one end with the free end of said lever arm and at its other end has a threaded rod 5 connected therewith, said rod extending through the rear wall of the casing or cabinet C and there provided with a nut 6 for securing and adjusting the spring in operative position. It is obvious that when it is desired to vary the tension of this spring that the nut may be loosened and the rod 5 either projected or withdrawn according to whether it is desired to loosen or tighten the tension of the spring, and the nut again positioned to hold it in adjusted relation. As shown this lever 1 is in the form of a right angle and is disposed with one arm extending rearwardly toward the rear wall of the cabinet, this being the arm with which the link 3 is connected and the other arm is disposed downwardly and connected at its free end with the spring 4. The link 3 extends through a slot 7 in the upper edge of the casing or cabinet C, said slot extending vertically through a flange 8 which projects laterally at one side of said cabinet and forms a part of the upper cross bar of said cabinet. This slot forms a guide for the link 3 and holds it against lateral movement, sufficient play being permitted for it to swing freely on the opening and closing of the top T with which the link is connected. A cushioning or jar absorbing spring 9 is preferably mounted between the upper edge of the horizontally disposed arm of the lever 1 and the lower face of the flange 8, and if desired a similar spring 10 may be mounted on the link 3 between the lower face of the flange 8 and a pin 11 which is extended transversely through said link to form a support for the lower end of the coiled spring 10. These springs cushion the opening movement of the lid or top T and prevent it from rising violently and they also exert their tension to assist in closing said lid.

From the above description, it will be obvious that when the top T is to be raised the latch L which connects it with the casing is first disengaged to release the top and immediately the spring 4 will exert its tension to draw the depending arms of lever 1 rear-

wardly and thereby elevates the free end of the horizontally disposed arm, thus exerting a forward force on the link 3 which is connected with the top T and consequently
 5 raises said top, the springs 9 and 10 serving to cushion the opening movement of the top and prevent it from moving too rapidly.

When it is desired to close the top, sufficient pressure may be exerted thereon to
 10 overcome the tension of the spring 4 which is effected by means of the downward force exerted on the link 3 and imparted to the horizontal arm of the lever 1 which causes the free end of said arm to move down-
 15 wardly and the free end of the depending arm to move forwardly, thus placing the spring 4 under tension ready to open the lid when the latch L is again released, it being of course understood that when the top T
 20 closes this latch will automatically spring into locking engagement with its coöperating element L' on the cabinet and thus securely hold the top in closed position.

In Figs. 3 and 4 a slightly different form
 25 of adjustment for the spring 4 is shown which comprises two telescopically engaged tubes 12 and 13 which are provided with longitudinally extending registering slots 14 and 15 through which a thumb screw 16 ex-
 30 tends and which is designed to lock these members 12 and 13 in adjusted position for

varying the tension of the spring 4 which is connected with the tube 13.

I claim as my invention:

The combination of a receptacle having a 35 hinged lid and a laterally extending member at its upper end, a bell crank lever fulcrumed to one wall of said receptacle and having one arm extending approximately in a horizontal plane and the other depending, 40 a link pivotally connected at one end to the free end of said horizontally disposed arm and to said hinged lid, a cushioned element arranged between said horizontal arm and said laterally extending member, a coiled 45 spring connected at one end to the free end of the depending arm of said bell crank lever, a threaded rod extending through one wall of said receptacle and connected at its inner end to the other end of said coiled 50 spring, a nut on the outer end of said threaded rod outside said receptacle whereby the tension of said spring may be controlled, and means for fastening said lid in closed 55 position.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

DANIEL THEODORE BUCKWALTER.

Witnesses:

HERMAN S. MILLS,
 CHARLES S. SANDS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

MATRIX FOR PRESSING SOUND RECORDS,
#1,194,795-----W.S. Tyler & F. L. Capps,
Patented-Aug. 15th, 1916.
Filed-July 15th, 1913.

W. S. TYLER & F. L. CAPPS.
 MATRIX FOR PRESSING SOUND RECORDS.
 APPLICATION FILED JULY 15, 1913.

1,194,795.

Patented Aug. 15, 1916.

Fig. 1.

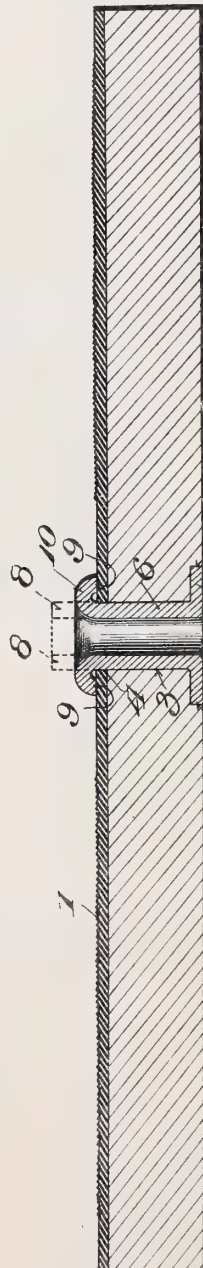
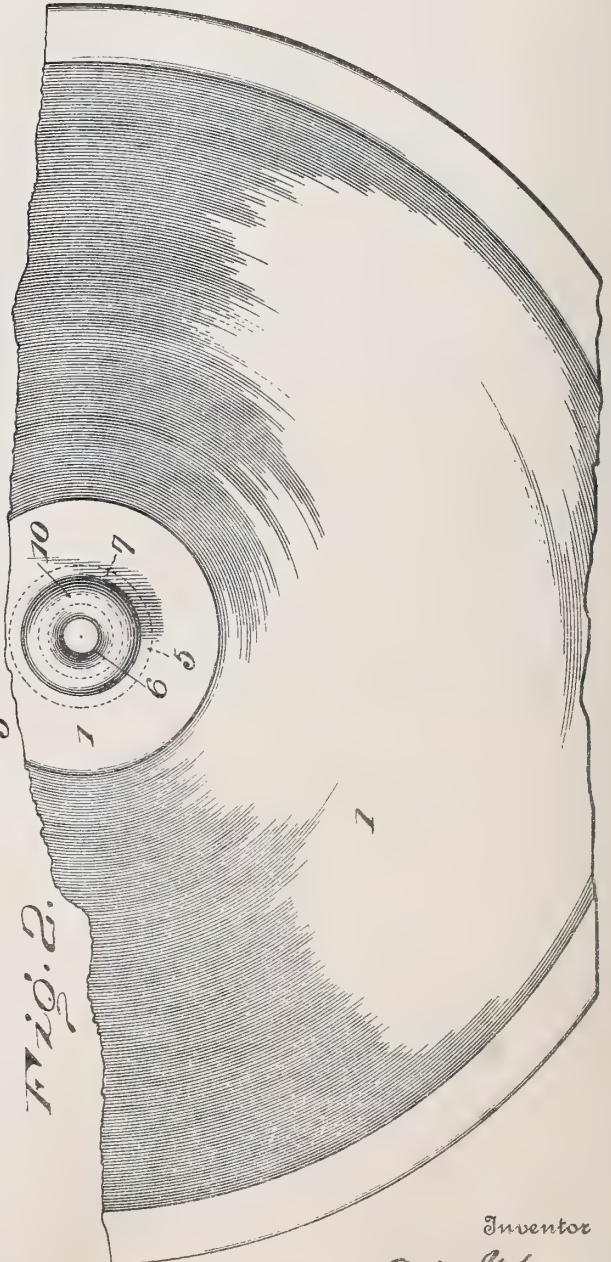


Fig. 2.



Witnesses
 James H. Anderson
 R. C. Fitzhugh

Inventor
 Walter S. Tyler and
 Frank L. Capps.
 By
 Mauro, Cameron, Lewis & Mason
 Attorneys

UNITED STATES PATENT OFFICE.

WALTER S. TYLER AND FRANK L. CAPPS, OF BRIDGEPORT, CONNECTICUT, ASSIGNORS
TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

MATRIX FOR PRESSING SOUND-RECORDS.

1,194,795.

Specification of Letters Patent.

Patented Aug. 15, 1916.

Application filed July 15, 1913. Serial No. 779,172.

To all whom it may concern:

Be it known that we, WALTER S. TYLER and FRANK L. CAPPS, of Bridgeport, Connecticut, have invented a new and useful Improvement in Matrices for Pressing Sound-Records, which invention is fully set forth in the following specification.

This invention relates to matrices for pressing sound-records. Such matrices are usually formed by electrolytically depositing a thin copper shell upon the original sound-record formed in wax or wax-like material, separating the thin copper shell from the original record, and backing or strengthening it by sweating it onto a thicker body of metal, such as copper. The matrix thus prepared is in the form of a circular disk, with an opening at its center, which opening is known as the centering opening, and which is a necessary feature when using the matrix to press sound-records therewith. These matrices are used over and over a large number of times, and it has been found in practice that, in placing the central opening of the matrix over the centering pin in the process of pressing a record, the thin copper shell in time is liable to peel up or become separated from the metal backing, thus producing in the record that is pressed from such a matrix an unsightly finish around the centering opening.

The object of the present invention is to overcome this difficulty, and with the same object in view, the invention consists in the means and combination of elements hereinafter described and then specifically defined in the claims.

The inventive idea is capable of receiving a variety of mechanical expressions, one of which, for the purpose of illustrating the invention, is shown in the accompanying drawing, but such drawing is for the purpose of illustration only, and is not meant to define the limits of the invention, reference being had to the claims for this purpose.

In said drawings, Figure 1 is a central vertical section, and Fig. 2 is a broken plan view.

Referring to the drawings, in which like reference characters indicate like parts, 1 is the electroplate or shell and 2 is the backing of metal or other suitable material, onto

which the copper shell 1 is sweated in the usual or any suitable manner.

3 is the central opening through the metal backing, and 4 a corresponding central opening through the shell 1. An annular recess 5 is formed in the rear or under side of the backing 2 and around the opening 3, and an eyelet 6, of any suitable material, such as brass, and having an annular flange 7 proportioned to fit the annular recess 5, is inserted through the opening 3, the eyelet being so proportioned as to make a tight fit in the openings 3 and 4, and when so inserted the eyelet is of the form shown in dotted lines in the drawing, the end 8 of the eyelet projecting up through the opening 4 in the shell 1 for a suitable distance, as shown in dotted lines in the drawing. This upwardly projecting end of the eyelet is then turned over and outward, by means of a suitable die, until it contacts with the upper surface of the shell 1, as shown at 9 in the drawing, thereby forming an annular bead 10 surrounding the opening in the matrix. Any other suitable form may be given to the overturned end 8 of the eyelet, but the bead shown is a desirable form, producing a small annular groove around the central opening in the record when the same is pressed from the matrix.

By the means shown, all the battering and wear incident to the use of the matrix is taken by the eyelet, and in case the same becomes damaged, it may be readily removed and another one inserted in its stead, thus avoiding the necessity of returning the matrix to the work-shop for repairs and for resweating the shell 1 to the backing 2. This latter operation consumes considerable time, during which the matrix is out of commission, whereas the eyelet forming the present invention can be removed, and a new one substituted, in a very few moments.

Having thus described our invention, what is claimed is:

1. In a matrix for pressing sound-records, the combination of the shell or matrix surface proper and the backing therefor, each of which is provided with a central opening therethrough, with an eyelet extending through and fitting said opening, and having one flanged shoulder engaging the rear

of the backing, and another flanged shoulder engaging the front face of the shell, one of said shoulders being formed by upsetting the end of the eyelet to hold the same in position.

5 2. In a matrix for pressing sound-records, the combination of a copper shell forming the face proper of the matrix, a metal backing therefor, said shell and backing being
10 each provided with a central opening therethrough, an eyelet fitting in said opening and having a flange engaging the rear of the backing, and an outwardly turned annular bead engaging the front face of said shell.

15 3. In a matrix for pressing sound-records, the combination of a metal shell forming the face proper of the matrix, a metal backing therefor, said shell and backing being provided with a centering opening there-
20 through, and an eyelet fitting snugly in said opening and provided with an outwardly

turned upset shoulder for engaging the shell.

4. In a matrix for pressing sound-records, the combination of a metal shell forming the face proper of the matrix, a metal backing
25 sweated thereto, said shell and backing each being provided with a centering opening therethrough, an eyelet fitting in said opening and having a flange engaging the rear
30 of the backing and an outwardly turned upset annular bead engaging the front face of said shell.

In testimony whereof we have signed this specification in the presence of two subscri-
35 ing witnesses.

WALTER S. TYLER.
FRANK L. CAPPS.

Witnesses:

JOHN S. GRIFFITH,
F. B. SAPORTO.

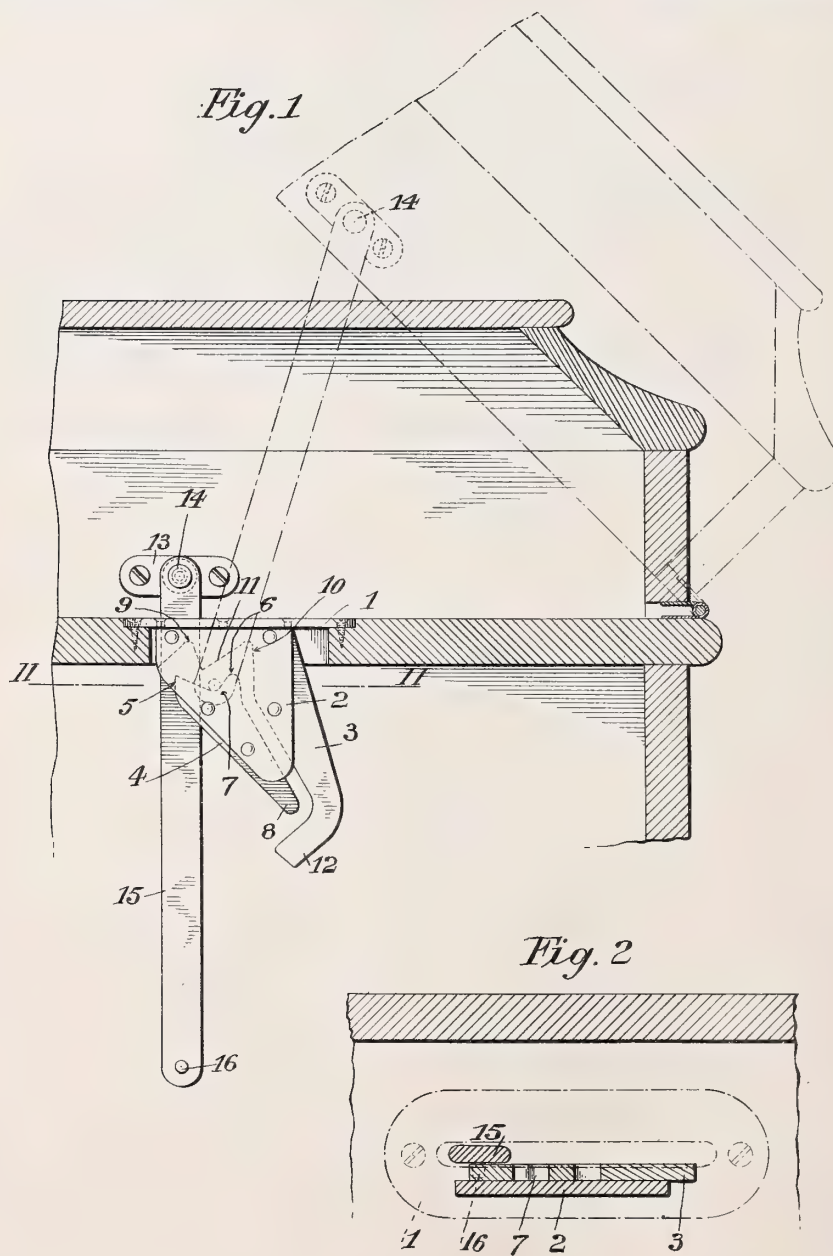
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

AUTOMATIC LID SUPPORT,
#1,194,805-----C. E. Woods,
Patented-August 15th, 1916.
Filed-July 23rd, 1914.

C. E. WOODS.
 AUTOMATIC LID SUPPORT.
 APPLICATION FILED JULY 23, 1914.

1,194,805.

Patented Aug. 15, 1916.



Witnesses:
 L. B. Wegnerast.
 Jas. H. Anderson.

Clinton E. Woods Inventor
 By his Attorneys
 Mauro, Ameron, Lewis & Kassar

UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

AUTOMATIC LID-SUPPORT.

1,194,805.

Specification of Letters Patent.

Patented Aug. 15, 1916.

Application filed July 23, 1914. Serial No. 852,656.

To all whom it may concern:

Be it known that I, CLINTON E. WOODS, a citizen of the United States, and a resident of Bridgeport, Fairfield county, Connecticut, have invented a new and useful Improvement in Automatic Lid-Supports, which invention is fully set forth in the following specification.

This invention relates to supports for the hinged lids or covers of boxes, trunks, and the like, in which the lid is to be swung upward, as by one hand, and is then to be held automatically propped open as long as desired, and is finally to be readily lowered by one hand. Heretofore automatic and semi-automatic devices of this character have been employed, but so far as is known they involved the use of spring-catches, or pivoted latches, or other movable mechanisms liable to get out of order.

The present invention consists broadly in providing, in addition to the ordinary prop-bar (pivoted at its upper end to the lid), merely a stationary and rigid guide therefor without any other moving part.

More particularly the invention consists of providing a rigid and stationary passage or thoroughfare of substantially the shape of a capital M, in combination with a projection on the end of the prop-bar that is adapted to travel through said thoroughfare and to be held supported in the seat provided thereby.

The invention consists further in the various features hereinafter set forth and claimed.

The invention is capable of being embodied in various forms, but will be best understood in connection with the accompanying drawings which illustrate a preferred form thereof as applied to the cabinet of a talking-machine.

In these drawings Figure 1 is a vertical section through a talking-machine cabinet showing a side elevation of the preferred form of the new automatic lid-support; and Fig. 2 is a horizontal view thereof partly broken away through the line II—II of Fig. 1.

The full lines in Fig. 1 represent the position of the parts when the cover is closed, the open position being indicated by the broken lines.

1 represents a slotted plate shown as secured to the platform of the talking-machine

cabinet; although it might be secured to the top edge of an ordinary box, trunk or chest. From plate 1 depends the flange-plate 2, parallel to the slot and located a slight distance inward therefrom, as indicated in Fig. 2. On the side adjacent the slot are the two guide-plates 3 and 4. Preferably, the flange-plate is made integral with the main plate 1, and the two guide-plates riveted to the flange-plate; but all these plates may be made integral if desired. At the upper end of the lower guide-plate are the two projections 5 and 6, which define between them the depression or seat 7; and the lower portion of this guide-plate is continued into the diagonal projection 8. In the adjacent edge of the upper guide-plate are the recesses 9 and 10, defining between them the projection 11, corresponding conversely to the projections and depression in the lower guide-plate; and the lower portion of this upper guide-plate is continued in the curved projection 12, that extends beneath the projection 8. Between the adjacent edges of these two guide-plates is thus defined a continuous passageway or thoroughfare, substantially the shape of a capital M, that comprises the seat 7. Upon the hinged lid or cover of the cabinet is secured a plate 13, carrying a pivot 14 upon which swings the rigid prop-bar 15. This bar extends through the slot in the main guide-plate, and at its lower end carries the stud or projection 16 that is adapted to pass through the thoroughfare referred to.

The operation of the device is obvious. When the lid is being raised from the closed position, it is seen that the pivot (14) is being carried toward the hinged-side of the cabinet, so that gravity causes the lower end of prop 15 to swing toward the same direction,—or rearwardly. In consequence, the projection 16 strikes against the cam-surface presented by the exposed lower edge of the plate or plates, and then is drawn upward and enters into the forward end of its passageway until its further upward passage is blocked in the recess 9, whereupon the lid can be raised no higher; and thereupon, on slightly lowering the lid, the projection drops by gravity into its seat 7, and the lid remains propped open,—all as indicated by dotted lines in Fig. 1. To close the lid, it must first be raised slightly, whereupon the projection 16 (swinging rearwardly by 110

gravity) enters the recess 10 (which blocks its further upward movement), whereupon the lid can be lowered, projection 16 passing freely out through its thoroughfare, and bar 5 15 dropping back to the original position indicated by full lines. The course of the projection 16 is manifest. The curving extension of the lower end of guide-plate 3, below the other guide-plate, prevents the 10 projection from entering the rear end of its thoroughfare (where there would be no means to bring the projection automatically into its seat 7), while the inclined lower edge of the plate 4 guides the projection up 15 into the outer entrance of the thoroughfare.

The invention has thus been described fully, with considerable detail, but only for the sake of clearness, since it is not limited to the precise construction and arrangement 20 of parts, but may be embodied in various forms.

Having thus described the invention, what is claimed is:

An automatic prop for the hinged lid of

a box or the like, consisting of a slotted 25 plate secured to the top of such box, a flange-plate depending therefrom, a lower guide-plate secured to the side of said flange-plate and having a seat on the upper edge thereof, an upper guide-plate secured 30 on the same side of said flange-plate and having its lower edge conforming to the upper edge of said lower guide-plate so as to produce a substantially M-shaped pas- 35 sageway between the adjacent edges of said guide-plates, a prop-bar pivoted to the lid and extending through said slot, and a projection on the lower end of said bar adapted to pass through said passageway and to rest 40 in said seat.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CLINTON E. WOODS.

Witnesses:

J. S. GRIFFITH,
LAURETTA T. NEAL.

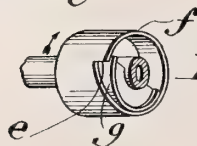
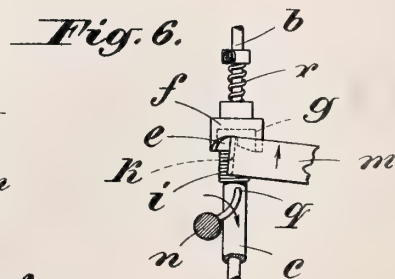
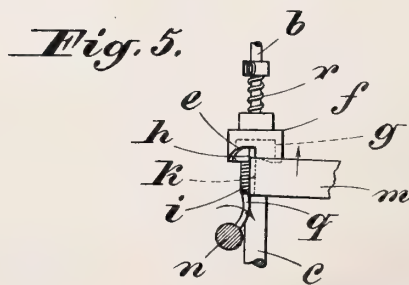
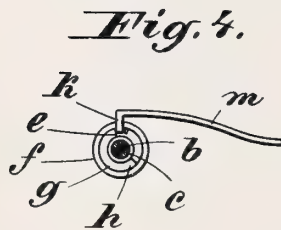
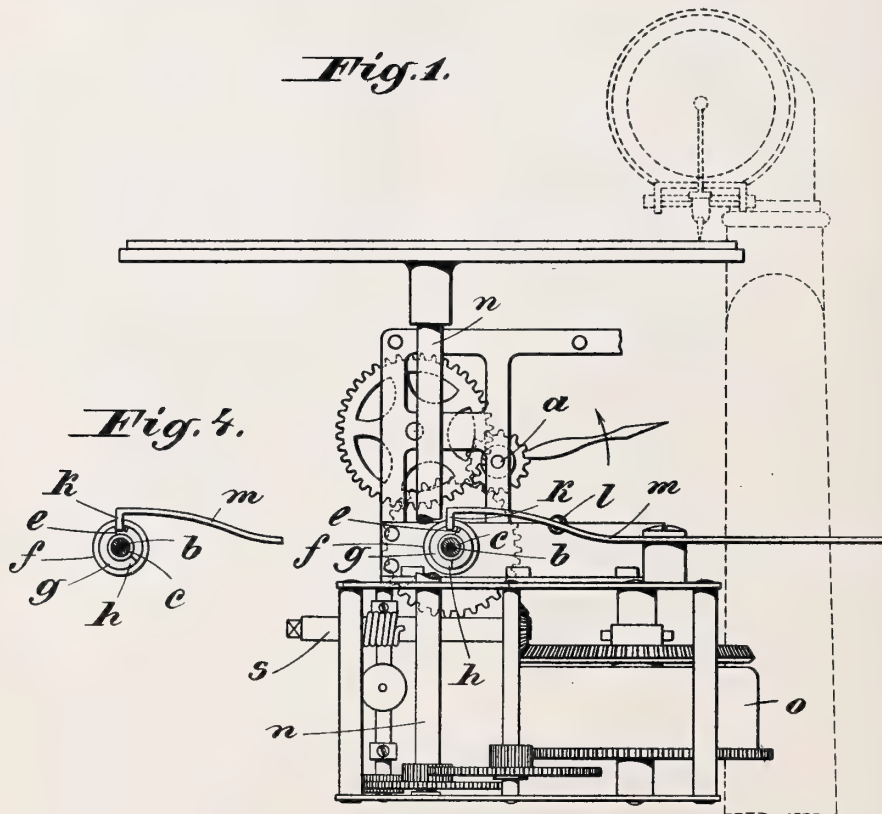
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TALKING CLOCK OR THE LIKE,
#1,194,855-----M. Marcus,
Patented-August 15th, 1916.
Filed-June 26th, 1914.

M. MARCUS.
TALKING CLOCK OR THE LIKE.
APPLICATION FILED JUNE 26, 1914.

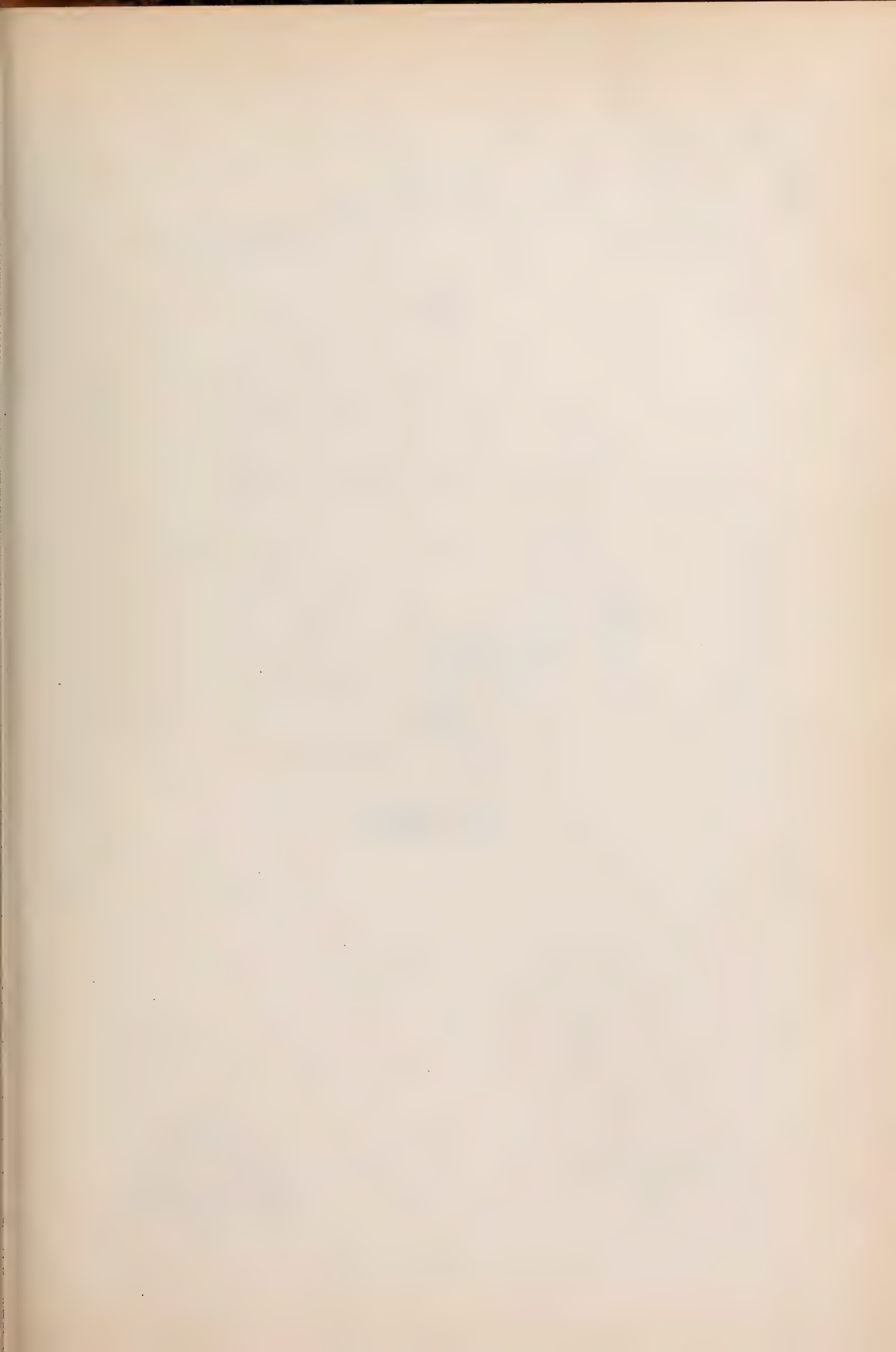
1,194,855.

Patented Aug. 15, 1916.
3 SHEETS—SHEET 1.



Witnesses:
Marguerite Schaup
Ray J Ernst

Fig. 4a. Inventor:
Max Marcus
by *Aug 4 1916*
his Attorney

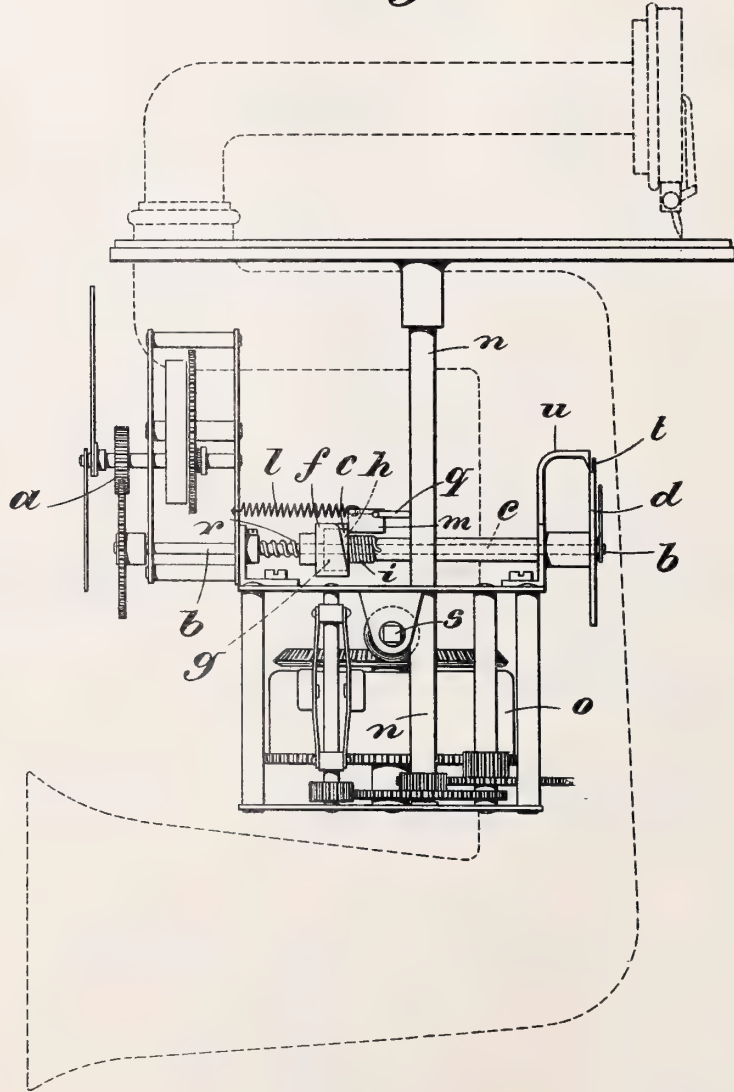


M. MARCUS.
TALKING CLOCK OR THE LIKE.
APPLICATION FILED JUNE 26, 1914.

1,194,855.

Patented Aug. 15, 1916.
3 SHEETS—SHEET 2.

Fig. 2.



Witnesses:
Marguerite Schaub
Ray J. Ernst.

Inventor:
Max Marcus
by *Amos B. B. B.*
his Attorney



M. MARCUS.
TALKING CLOCK OR THE LIKE.
APPLICATION FILED JUNE 26, 1914.

1,194,855.

Patented Aug. 15, 1916.
3 SHEETS—SHEET 3.

Fig. 3.

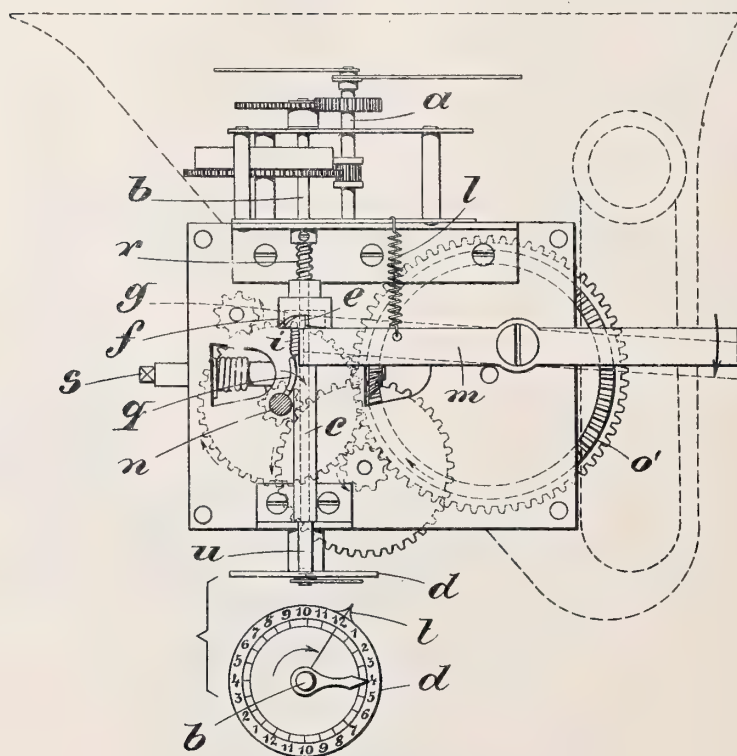
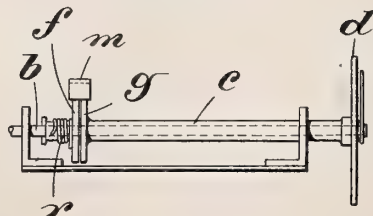
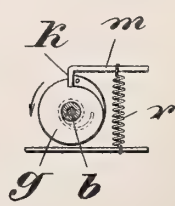
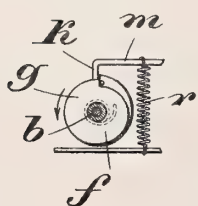


Fig. 7.

Fig. 8.

Fig. 9.



Witnesses:
Marguerite Schaub
Ray G. Ernst

Inventor:
Max Marcus
by *King & Wood*
his attorneys

UNITED STATES PATENT OFFICE.

MAX MARCUS, OF PANKOW, NEAR BERLIN, GERMANY.

TALKING-CLOCK OR THE LIKE.

1,194,855.

Specification of Letters Patent.

Patented Aug. 15, 1916.

Application filed June 26, 1914. Serial No. 847,480.

To all whom it may concern:

Be it known that I, MAX MARCUS, a subject of the King of Prussia, residing at Pankow, near Berlin, Germany, have invented new and useful Improvements in Talking-Clocks or the like, of which the following is a specification.

This invention relates to a device for releasing the sound reproducing mechanism of talking clocks and the like.

Compared to the releasing devices for the sound reproducing mechanism in alarm clocks and the like, hitherto known, the essential feature of this invention consists in the fact that, owing to the arrangement of a locking device on the gear of the hands, the driving gear of the sound reproducing mechanism or the like is directly released and, after moving a locking lever, stopped again and automatically reset for the next release, without any further manipulation.

In the accompanying drawings, Figure 1 shows a construction of the device in side elevation. Fig. 2 is a front elevation of Fig. 1, Fig. 3 a plan of Fig. 1, Figs. 4 to 6 are detail views of the release device shown in Figs. 1 to 3, while Figs. 7 to 9 show a somewhat modified construction in which two disks with notches are provided in place of two sleeves with notches.

On an auxiliary spindle *b* connected to the hour hand spindle *a* by means of intermediate wheels with a given ratio of transmission, is mounted a sleeve *c* with a disk *d* secured to it and provided with divisions corresponding to the time intervals; the disk can be set to release the mechanism at any predetermined moment by a division on the disk being brought opposite a hand secured to the intermediate spindle *b*.

A sleeve *f* provided with a cam groove *e* is secured to the sleeve *c* while a second sleeve *g*, also provided with a cam groove and projecting into the former, is rotatably mounted on the sleeve *c*, in such a manner that, owing to the action of a torsion spring *i*, it always has the tendency to cover the notch *e* in the sleeve *f*. A locking lever *m* engaging by means of a projection *h* with the circumferential periphery of the two sleeves *f g* under the action of a tension

spring *l*, keeps the spindle *n*, which has driving connections with the spring motor *o* in the position of rest by means of a stop *q* or its equivalent until the notch *e* in the sleeve *f* has rotated to the extent determined for it by the disk *d*. The locking lever *m*, after it has pressed back the sleeve *g* by means of the cam surface *h*, thus simultaneously tensioning the spring *i*, suddenly springs into the notch *e*, of the sleeve *f* and in that way releases the spindle *n* together with its train of wheels, governor, etc., operated by the spring motor *o*, and controlled by the stop *q*. By simply moving back the locking lever *m* (which is done by hand in the present embodiment) the further movement of the driving spindle of the talking machine is stopped, the locking lever *m* at once engaging with the stop *q* of the driving spindle. If the lever *m* is moved back by hand after its engagement with the notch *e* of the sleeve *f* the inner sleeve *g* springs back into place covering the notch and the lever *m* thus rests upon the front or circular edge of the sleeve *g* over which it slides while the sleeves continue their rotation. But if the lever *m* is not moved back by hand it remains in the notch until the sloping edge thereof gradually returns it to the level of the front edge of the sleeve in which position it stops the rotation of the driving spindle *n*.

The sleeve *f* is held in driving connection with the auxiliary spindle *b* and through it with the hour hand spindle *a* by a spring *r* which presses the sleeve or the face of the disk *d* mounted upon it, into frictional engagement with the back of the hand or pointer fastened on to the spindle *b*. The sleeve thus normally rotates with the spindle *b* but can be turned relatively thereto for setting purposes. After the driving spindle *n* of the sound-reproducing mechanism has been stopped by the locking lever being moved back the next temporary release will occur after a time interval corresponding to the rate of transmission of the wheels. The winding is accomplished by means of a spindle *s* and the gear *o'* is designed in accordance with the speed required for the driving spindle *n*. When the disk *d* has been set for a given time, it is therefore not necessary,

apart from winding the motor *o* to do anything subsequently to reproducing the release at a given time interval corresponding to the rate of transmission of the wheels, except to bring the locking lever *m* back to the original position, after the release has taken place.

If the time of release is to be altered, this may be done simply by shifting the disk *d* to the desired time opposite the hand of the intermediate spindle *b*, the projection *k* of the locking lever *m* then springing into the notches of the sleeves *f g* after a correspondingly longer or shorter time interval.

To enable any desired adjustment to be effected, even without having to consider the position of the hand on the dial, the disk *d* with the divisions can be provided in the known manner with a line *t* which can be set against a fixed index finger *u*, for instance so that when the two marks coincide, the release of spindle *n* always takes place.

Figs. 7 to 9 show a modified construction for the same purpose, in which, in place of the two sleeves *f* and *g* provided with notches, two disks *f* and *g* are employed, the application and the working remaining the same as in the arrangement already described.

What I do claim as my invention, and desire to secure by Letters Patent of the United States, is:—

1. A device for releasing the sound reproducing mechanism of talking clocks or alarms comprising a clockwork driven spindle, driving gear for the sound reproducing mechanism, a stop for the same, a lever for engaging and releasing said stop and a plurality of controlling members for said lever mounted on said spindle, movable relatively to each other and yieldingly connected.

2. A device for releasing the sound reproducing mechanism of talking clocks or alarms comprising clockwork driving mechanism including an hour hand spindle, a spindle driven by the hour hand spindle, an auxiliary spindle mounted on the first spindle and movable relatively thereto, means for indicating the amount of said relative motion, a locking lever for the sound reproducing mechanism, controlling members therefor yieldingly connected to the spindle and auxiliary spindle respectively and a stop device for the sound reproducing mechanism controlled by the locking lever.

3. A device for releasing the sound reproducing mechanism of talking clocks and alarms comprising clockwork driving mechanism including an hour hand spindle, a spindle driven by the hour hand spindle, a cam-bearing member movable with said spindle, an auxiliary spindle mounted on the first spindle and movable relatively thereto, a second cam-bearing member car-

ried by said auxiliary spindle and movable relatively to the first cam-bearing member, means for adjusting the position of one spindle relatively to the other, means for indicating the extent of such relative adjustment, a locking lever for the sound reproducing mechanism adapted to engage with the cam surfaces of the members and a stop device for the sound reproducing mechanism controlled by the locking lever.

4. A device for releasing the sound reproducing mechanism of talking clocks and alarms comprising clockwork driving mechanism including an hour hand spindle, a spindle driven by the hour hand spindle, a cam sleeve coaxial with said spindle, an auxiliary spindle mounted on the first spindle and movable relatively thereto, a second cam sleeve carried by said auxiliary spindle and coöperating with the first cam sleeve, means for adjusting the position of one spindle relatively to the other, means for indicating the extent of such relative adjustment, a locking lever for the sound reproducing mechanism adapted to engage with the cam surfaces of the sleeve, and a stop device for the sound reproducing mechanism controlled by the locking lever.

5. A device for releasing the sound reproducing mechanism of talking clocks and alarms comprising clockwork driving mechanism, including an hour hand spindle, a spindle driven by the hour hand spindle, a cam sleeve yieldably connected to said driven spindle, an auxiliary spindle mounted on the driven spindle and movable relatively thereto, a second spring-controlled cam sleeve carried by said auxiliary spindle and coöperating with the first cam sleeve, means for adjusting the position of one spindle relatively to the other, means for indicating the extent of such relative adjustment, a spring-controlled locking lever for the sound reproducing mechanism adapted to engage with the cam surfaces of the sleeve and a stop device for the sound reproducing mechanism controlled by the locking lever.

6. A device for releasing the sound reproducing mechanism of talking clocks and alarms, comprising a clockwork driven spindle and another spindle mounted thereon, cams connected respectively to said spindles, a locking lever coöperating with said cams, means for operating sound reproducing mechanism, said means being provided with a stop, and a locking lever coöperating with said stop and controlled by said cams.

7. A device for releasing the sound reproducing mechanism of talking clocks and alarms, comprising a clockwork driven spindle and another spindle mounted thereon, cams connected respectively to said spindles, a locking lever coöperating with said cams,

means for operating sound reproducing mechanism, said means being provided with a stop, a locking lever cooperating with said stop and controlled by said cams and means
5 for adjusting the relative positions of said cams.

my hand in presence of two subscribing witnesses.

MAX MARCUS.

Witnesses:

WOLDEMAR HAUPT,
HENRY HASPER.

In testimony whereof I have hereunto set

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

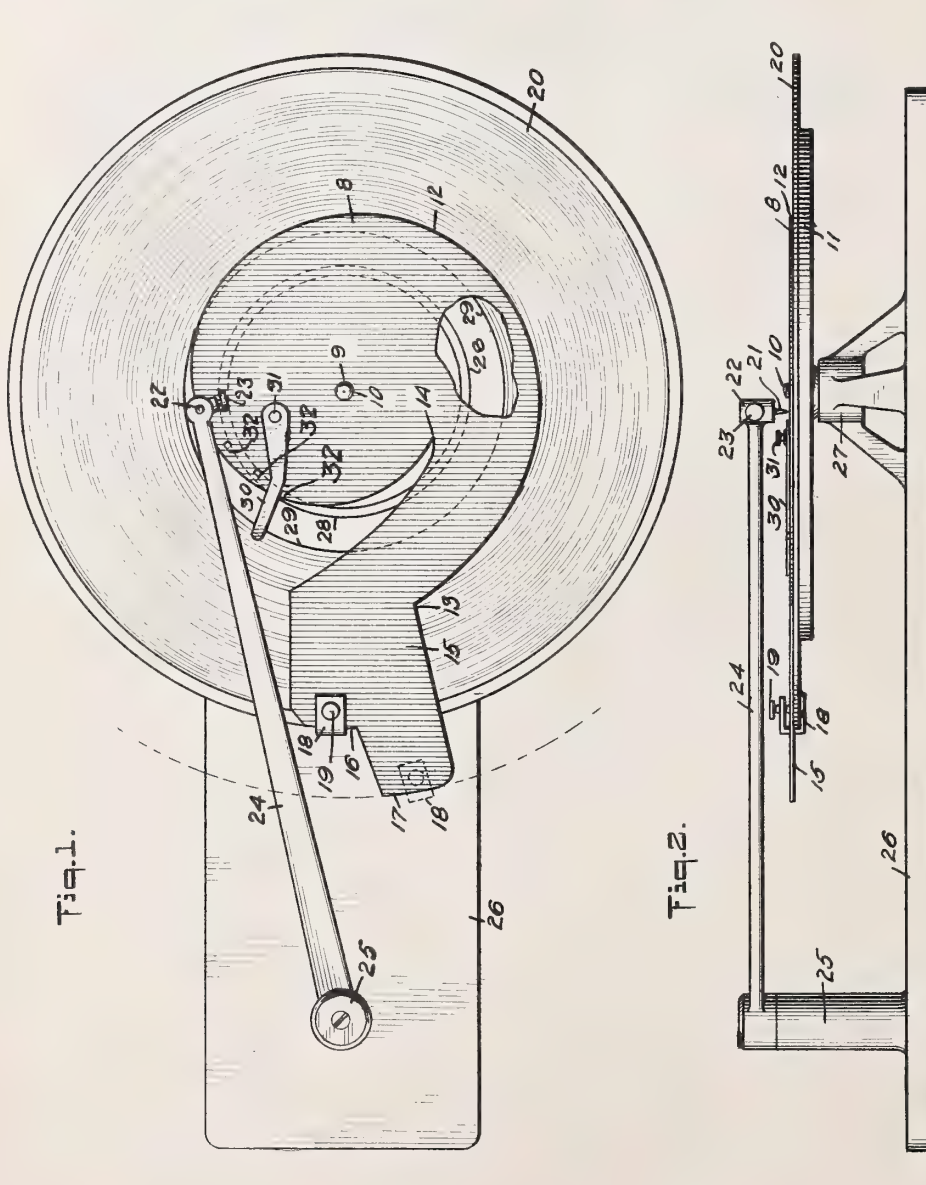
APPARATUS FOR CUTTING GROOVES IN RECORD
DISKS,

#1,195,101-----R. Schiffman,
Patented-Aug. 15th, 1916.
Filed-April 23rd, 1915.

R. SCHIFFMAN.
 APPARATUS FOR CUTTING GROOVES IN RECORD DISKS.
 APPLICATION FILED APR. 23, 1915.

1,195,101.

Patented Aug. 15, 1916.



WITNESSES:

Wm. A. ...
Edw. ...

INVENTOR

Robert Schiffman.

BY *Munn & Co.*

ATTORNEY

UNITED STATES PATENT OFFICE.

ROBERT SCHIFFMAN, OF TOLEDO, OHIO.

APPARATUS FOR CUTTING GROOVES IN RECORD-DISKS.

1,195,101.

Specification of Letters Patent.

Patented Aug. 15, 1916.

Application filed April 23, 1915. Serial No. 23,356.

To all whom it may concern:

Be it known that I, ROBERT SCHIFFMAN, a citizen of the United States, and a resident of Toledo, in the county of Lucas and State of Ohio, have invented a new and Improved Apparatus for Cutting Grooves in Record-Disks, of which the following is a full, clear, and exact description.

Among the principal objects which the present invention has in view are: to provide means for adding a circular groove to a record disk for a talking machine, and means for rapidly transferring the needle of a talking machine from the record groove to said circular groove; to provide means for adjusting the apparatus to record disks of different diameters; to provide means for regulating the diameter of said circular grooves; and to provide means for facilitating the cutting of said circular groove and a switch groove connecting the same with the record groove.

Drawings.—Figure 1 is a top plan view of an apparatus constructed and arranged in accordance with the present invention, showing in conjunction therewith a talking machine record disk; and Fig. 2 is a side elevation of the same.

Description.—As seen in the accompanying drawings, a scribing plate 8 has a perforation 9 adapted to fit over and obtain bearing upon a centering pin 10 which in the present invention is centrally located in a rotatable table 11. The pin 10 corresponds with the centering pin employed in the rotary table of the talking machine. The scribing plate 8 has an exterior ruling edge, said edge being spirally formed to a regularly diminishing curve, said curve extending from the exterior angle 13 to the interior angle 14, as best shown in Fig. 1 of the drawings. From the plate 8 is extended a gage member. The member 15 is shaped to form the gage edges 16 and 17. The edges 16 and 17 correspond with the edges of ten-inch and twelve-inch record disks. The clamp 18 is U-shaped and one arm of the clamp is tapped to engage the threads of a screw 19. It is obvious that in service the clamp 18 may be shifted to engage a twelve-inch or a ten-inch record disk.

The cutting or grooving which is performed by means of the present apparatus, on the record disk, such as indicated in the drawings by the numeral 20, is effected by

the stylus 21. The stylus 21 is mounted, in service, in a chuck 22 of any convenient type. The chuck shown in the drawings employs a set screw 23 for holding the stylus 21 rigid in service. The chuck 22 is formed at the end of a swinging arm 24. The arm 24 is pivotally mounted on the standard 25 erected upon a base plate 26 as shown in Fig. 2 of the drawings. The base plate 26 also provides the turret 27 from which extends the pin 10.

The groove 28 is herein termed the stopping groove. It is circular in form being designed to hold a needle of a reproducer and the sound box connected therewith from traveling to or from the center of the record disk 20. It is desired that this stopping groove should be as close to the inner convolution 29 of the record groove as possible. To this end, the edge of the plate 8 is spirally shaped. At the inner terminus of the said edge in the angle 14 an arm 30 is mounted by the pivot 31 on the plate 8 to extend beyond the edge thereof. As the said arm is swung to and from the angle 14, it operates to hold the stylus 21 in the angle formed by said arm and the edge of the plate. The distance from the center of the plate or of the pin 10 increases as the arm 30 is moved away from the angle 14. By adjusting the arm 30, the angle formed thereby with the edge of the plate, may be arranged to hold the stylus in closer relation to the inner convolution of the groove 29.

Operation.—Having an apparatus constructed and arranged as described and shown in the accompanying drawings, the operation as performed upon a record disk is as follows: The disk 20 is first disposed on the table 11. The disk having been centered by means of the pin 10, the scribing plate 8 is superposed thereon, the perforation 9 receiving the said pin 10. It having been ascertained that the record disk is a ten or a twelve-inch disk, the clamp 18 is shifted to accommodate the same, the plate 8 being thereby secured rigidly in position upon said record disk. The arm 30 is moved on its pivot 31 until the angle formed thereby with the edge of the plate 8 registers with reference to the last convolution of the record groove 29. The arm 30 is maintained in its adjusted position by small abutments 32, which extend upward from the surface of the plate 8 to hold the arm 30 during the

formation of the stop groove by the stylus 21. The arm 24 is swung over the record disk 20 until the stylus 21 strikes upon the ruling edge 12 of the plate 8. The disk 20 is shifted until the intersection of the last convolution of the record groove of the disk, and the ruling edge 12 of the plate 8 registers with the position of the stylus 21. Pressure is applied to the chuck 22 and stylus 21 therein, while the disk 20 and table 11 are slowly rotated clockwise. The pressure which is applied to the stylus 21 holds the same upon the record and simultaneously maintains the same against the edge 12 of the plate 8. In the course of the rotation of the disk 20 and plate 8, the stylus 21 is engaged by the arm 30. The screw 19 and the clamp 18 is then released. The operator now holds the arm 30, plate 8 and stylus 21 fixedly, while he turns the table 11, and the record disk 20 thereon. This results in cutting by means of the stylus 21, a complete circular groove. When record disks thus prepared are placed upon the rotary table of a talking machine it will be found that when the record needle reaches the end of the record groove it passes through the relatively short switch grooves formed to the curvature of the ruling edge 12, to the circular or stopping grooves 28. If the machine is not then arrested it will be found that the reproducing needle runs around the circular groove 28, the sound box and tone tube of the talking machine being thereby

held as if operating with a mechanical stopping mechanism. 35

Claim:

An apparatus as characterized comprising a plate having a spirally curved marking edge; means for adjustably holding said plate upon a talking machine record disk, the marking edge of said plate intersecting the innermost convolution of the record groove on said disk, said means embodying a perforation concentric with the axis of said marking edge, and a lateral extension of said plate, said extension exceeding in length the radius of the record disk; a swinging arm pivotally mounted beyond the area occupied by said record disk; means disposed at the free end of said arm for holding a cutting stylus; a cutting stylus held by said means in operative relation to a record disk; a stylus engaging arm adjustably mounted on said plate and extending beyond the marking edge thereof, said arm being adapted for forming angles with said plate at different points on said edge, said angles being variously distant from said perforation; and means for holding said arm in adjusted position. 40 45 50 55 60

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT SCHIFFMAN.

Witnesses:

WILLIAM F. JACOB,
FRED SCHIFFMAN.

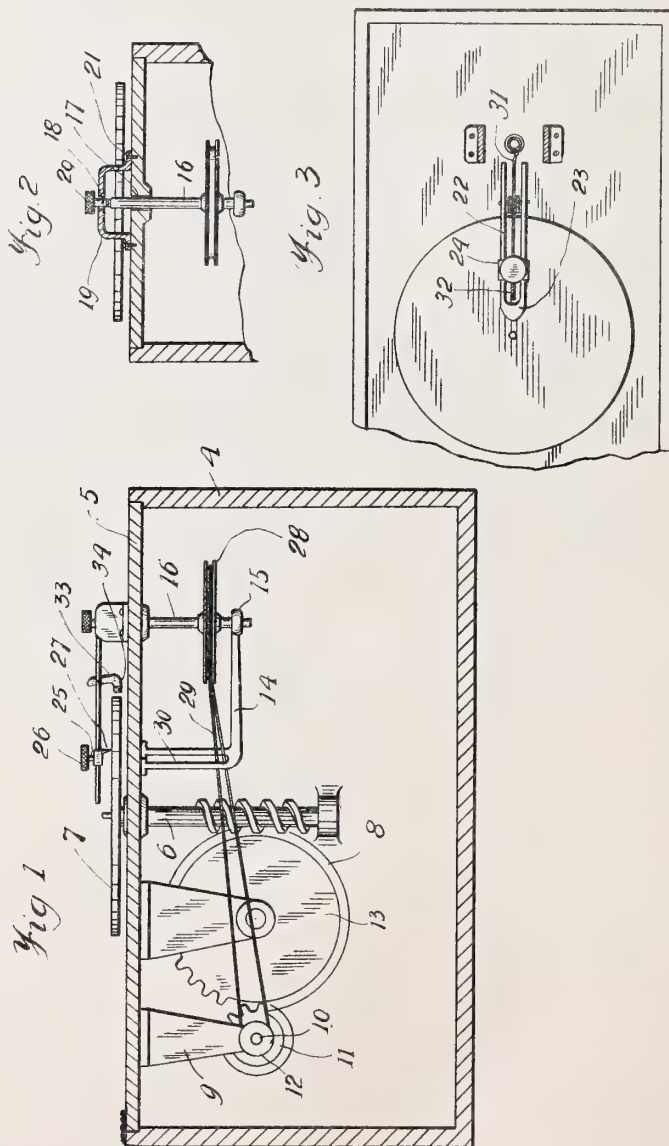
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

STOPPING DEVICE FOR GRAPHOPHONES,
#1,195,200-----A. Gantz,
Patented-Aug. 22, 1916.
Filed-June 24, 1914.

A. GÁNTZ.
STOPPING DEVICE FOR GRAPHOPHONES.
APPLICATION FILED JUNE 24, 1914.

1,195,200.

Patented Aug. 22, 1916.



WITNESSES
Raph W. Smith
Max H. Folling

INVENTOR
Andrew Gantz
Henry C. Everett
ATTORNEY

UNITED STATES PATENT OFFICE.

ANDREW GÁNTZ, OF WILLOCK, PENNSYLVANIA.

STOPPING DEVICE FOR GRAPHOPHONES.

1,195,200.

Specification of Letters Patent.

Patented Aug. 22, 1916.

Application filed June 24, 1914. Serial No. 847,080.

To all whom it may concern:

Be it known that I, ANDREW GÁNTZ, a subject of the King of Hungary, residing at Willock, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Stopping Devices for Graphophones, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to an attachment for graphophones and has for its object to provide means, in a manner as hereinafter set forth, for automatically stopping the operating mechanism after the needle has completely traversed a disk thereby overcoming the necessity of employing an attendant to manually stop the machine after the completion of the playing of a record.

Further objects of the invention are to provide a stop attachment for graphophones in a manner as hereinafter set forth, and operated from the motor of the machine, for automatically discontinuing the operation of the latter after the completion of the playing of a record.

Further objects of the invention are to provide a stop attachment for graphophones which is simple in its construction and arrangement, strong, durable, automatic in its action, readily set up with respect to the casing of the machine, as well as the motor mechanism of the machine, and inexpensive.

With the foregoing and other objects in view the invention consists of a novel construction, combination and arrangement of parts, as hereinafter more specifically described and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications, can be resorted to which come within the scope of the claim hereunto appended.

In the drawings wherein like reference characters denote corresponding parts throughout the several views:—Figure 1 is a longitudinal sectional view of a graphophone casing disclosing the stop mechanism and other various parts assembled. Fig. 2, is a transverse sectional view illustrating the stop attachment in connection with the disk of the machine, and Fig. 3, is a top plan view, part in section, illustrating the stop attachment.

Referring to the drawing in detail 4 denotes the machine casing the latter having

a hinged top 5, through which projects the shaft 6, for driving the record disk 7, shaft 6 being operated by a motor mechanism 8. Depending from the lower face of the top 5, is a bracket 9, having at its lower end a shaft 10 upon which is mounted a pinion 11, and a pulley 12. The pinion 11 meshes with and is driven by a gear 13 of the motor mechanism 8. Depending from the lower face of the top 5 is an L-shaped arm 14, having a bearing 15, through which extends a vertically disposed shaft 16, the latter projecting upwardly through an opening 17, formed in the top 5. The upper end of the shaft 16 is reduced as at 18 and projects through a supporting bracket 19. The reduced upper end of the shaft 16, above the bracket 19, is provided with a knurled head 20. The bracket 19 is of inverted U-shaped and is fixedly secured to the upper face of the top 5, by the screws 21. Projecting from one side of the bracket 19 and over the record disk 7, is a pair of guide arms 22, which are arranged in parallelism and connected together at their outer ends as at 23. Slidably mounted upon the guide arms 22 is a trip member 24, having a stem 25 projecting from the top thereof and the said stem 25 has a knurled head 26. Depending from the trip member 25 is a lug 27. The shaft 16, below the top 5 has secured thereto a grooved pulley 28, which is disposed at right angles with respect to the pinion 11, and is driven from said pinion 11, through the medium of the pulley 12 and an endless belt 29 which passes around the pulley 12 and over the pulley 28. The arm 14 is slotted, as at 30, for the passage of the belt 29.

In the foregoing arrangement it is obvious that when the motor 8, is thrown into operation, the shaft 16 will be revolved through the drive connection between the shaft 16 and the shaft 10.

Adapted to wind upon the reduced portion 18 of the shaft 16, is a flexible pulling member 31, which is connected to the trip member 24. The trip member 24 has a resilient element 32 projecting therefrom, and which when the member 24 is pulled inward abuts against the coupling member 23. The trip member 24 is pulled outward by the member 31 when the latter winds up on the reduced end of the shaft 16.

Pivotally supported by the guide arms 22, as well as depending therefrom, is an L-shaped trip arm 33 which is adapted to

be tripped by the member 24. A horizontal leg 34 projects inwardly from the arm 33 and normally lies adjacent the edge of the record, but when member 24 bears against arm 33, the leg 34 will be brought into engagement with the side of the record disk and arrest the movement thereof. This mechanism will automatically stop the machine. The arm 33 will be held in engagement with the record disk 7, as long as the member 24 bears against the vertical portion of said arm 33.

A disk record is placed in position on shaft 6 which is driven by the usual motor. Shaft 6 turns, through intermediate gearing shaft 10 which carries pulley 12. When the motor is started, pulley 28 is rotated by member 29 and this rotation turns the shaft 16 on which the flexible member 31 is adapted to wind. This flexible member being attached to member 24 will draw or slide the same toward it when the machine is being operated. When member 24 bears against the stop arm 33, the leg 34 will be forced against the side of the record disk and stop the same until released. A spring

32 is provided to return the member 24 to its normal position near the center of the disk. Thus it will be seen that the machine is automatically stopped.

What I claim is:—

A stop attachment for graphophone disks comprising a shaft adapted to be rotated when the motor is in operation, guides projecting from each side of said shaft, a sliding member mounted on said guides, a flexible member secured to said shaft and said sliding member and adapted to wind around said shaft whereby to draw said sliding member toward said shaft, and a stop member having a horizontal leg secured at the bottom thereof and in the path of said sliding member, said leg being adapted to be forced against a record disk when said sliding member bears against the top of said stop member.

In testimony whereof I affix my signature in the presence of two witnesses.

ANDREW GÁNTZ.

Witnesses:

MAX H. SROLOVITZ,
MARIE H. ZBIERA.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND AMPLIFIER,
#1,195,783-----W. H. Crawford,
Patented-Aug. 22nd, 1916.
Filed April 17th, 1915.

W. H. CRAWFORD.
SOUND AMPLIFIER.
APPLICATION FILED APR. 17, 1915.

1,195,783.

Patented Aug. 22, 1916.

Fig. 1.

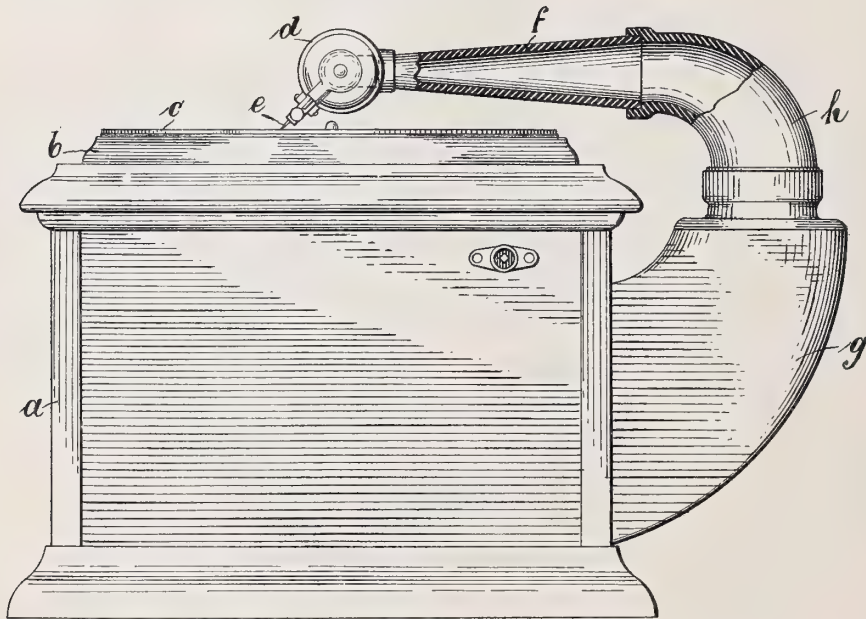


Fig. 2.

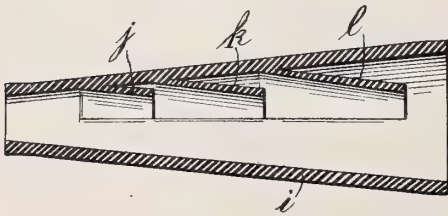
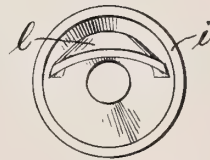


Fig. 3.



Witness
Wm. H. Hawkins

Inventor
William H. Crawford
By his Attorney
L. K. Böhm.

UNITED STATES PATENT OFFICE.

WILLIAM H. CRAWFORD, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR OF ONE-HALF TO
OLIVER FLETCHER BEST, OF PROVIDENCE, RHODE ISLAND.

SOUND-AMPLIFIER.

1,195,783.

Specification of Letters Patent. Patented Aug. 22, 1916.

Application filed April 17, 1915. Serial No. 21,940.

To all whom it may concern:

Be it known that I, WILLIAM H. CRAWFORD, a citizen of the United States of America, and a resident of Providence, county of Providence, State of Rhode Island, have invented certain new and useful Improvements in Sound-Amplifiers, of which the following is a specification.

This invention has reference to improvements in phonographs, graphophones, talking machines and the like which are used for recording and reproducing music, articulate speech and other sounds.

Assuming that sound is to be reproduced then the stylus carried by the sound-box passes through the record grooves and repeats the original vibrations in the diaphragm. In this way the sound is reproduced and passes from the reproducer or sound box through the reproducer connection into the sound amplifying or megaphone horn. The reproducer connection is made of metal while the sound amplifying horn is made of sound resonating material such as wood and the like. The metallic reproducer connection, however, acting as part of the sound amplifying means is the cause of shrieking sounds and secondary noises which are not transformed by the sound resonating horn, but further amplified. Accordingly the quality of the tone is impaired and especially at the beginning of the reproduction of sound from a record shrieking sounds and secondary noises are disagreeable and disturb the impression on the mind of the listeners. Furthermore, in most phonographs the sound waves passing through the reproducer connection strike against curved inner walls of the amplifying horn or intermediary parts, sometimes at a right angle thereto whereby said sound waves are thrown back instead of being deflected forward. It is evident that sound waves thrown rearward collide with sound waves passing in a forward direction whereby a disturbance is caused.

It is the purpose of the present invention to overcome the described defects. This has been primarily attained by constructing the reproducer connection of sound resonating materials, such as wood, hard rubber, celluloid and fibrous compositions whereby shrieking sounds and secondary noises are avoided. In order to deflect the sound waves properly I may provide within the repro-

ducer connection sound deflecting leaves which divert the sound waves into the amplifying horn whereby the disturbances just described are avoided.

In order to render the invention entirely clear reference is had to the accompanying drawing in which:—

Figure 1 represents in side elevation, partly in section, a phonograph with a reproducer connection composed of sound resonating material, embodying in desirable form the present improvements. Fig. 2 shows in longitudinal cross section a somewhat modified form of the reproducer connection. Fig. 3 is a front view of the device illustrated in Fig. 2.

Similar characters of reference denote like parts in all the figures.

In the drawing, *a* represents the phonograph box, *b* is the record support and *c* illustrates a record disk. The reproducer or sound box *d* carries the stylus *e* which travels in the grooves of the record disk. From the reproducer or sound box the reproducer connection *f* extends in the direction of the sound amplifying horn or megaphone *g*. The reproducer connection *f* is a conical tube which is composed of sound resonating material such as wood, hard rubber, celluloid, artificial fibrous compositions and the like. A curved tube *h* connects the reproducer tube *f* with the sound amplifying horn *g*. This tube *h* also is composed of one of the sound resonating materials herein specified.

In the described construction there is no intermediary part between the sound box and the amplifying horn which is composed of metal or other materials spontaneously detrimental to the quality of the reproduced sound. Accordingly the sound issued by a phonograph embodying the present improvement is free from shrieking and secondary noises, it is euphonious and greatly improved.

In Figs. 2 and 3 of the drawing a somewhat modified reproducer connection is illustrated. The conical reproducer tube *i*, composed of sound resonating materials, is provided with sound deflecting leaves *j*, *k*, *l*, made of the same material of which the tube is constructed. These sound deflecting leaves are curved in conformity to the inner surface of the tube as shown in Fig. 3. As the sound is to be diverted in a certain di-

rection these leaves are so arranged that the sound is diverted in the desired direction. In the example illustrated the sound is to be diverted in a downward direction, therefore the sound deflecting leaves are located in the upper portion of the reproducer tube *i*. In this way I avoid that the sound waves impinge upon the inner wall of the curved connecting tube *h* in such a manner as to be thrown rearward. On the contrary the sound waves are properly diverted and no disturbance in the course of the sound waves takes place. The sound deflecting leaves accordingly aid in the production of harmonious tones.

I claim as my invention:

1. A sound amplifier, comprising means for reproducing sound, a short curved tube of sound resonating material, a conical reproducer connection composed of sound resonat-

ing material between said means and curved tube, and sound deflecting leaves within the connection arranged in one longitudinal section thereof.

2. A sound amplifier, having means for reproducing sound and a sound amplifying horn, an intermediary conical reproducer connection transmitting sound unobstructedly in a straight path and composed of sound resonating material, and provided with sound deflecting means within the said connection arranged in one longitudinal section thereof.

Signed at New York, N. Y., this 16th day of April, 1915.

WILLIAM H. CRAWFORD.

Witnesses:

IDA E. ROLAND,
ELEANORE J. HOFFMANN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

BRAKE FOR TALKING MACHINES,
#1,196,265-----H.H.Murray & W.D.La Rue,
Patented-Aug. 29th, 1916.
Filed-Feb. 1st, 1912.

H. H. MURRAY & W. D. LA RUE.
BRAKE FOR TALKING MACHINES.
APPLICATION FILED FEB. 1, 1912.

1,196,265.

Patented Aug. 29, 1916.

Fig. 1.

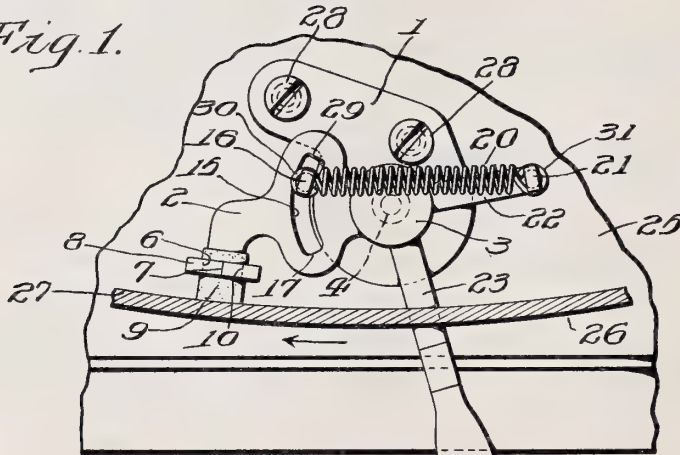


Fig. 2.

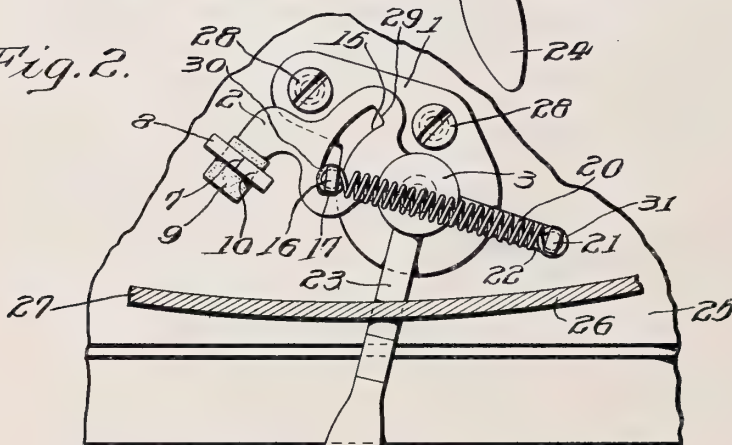
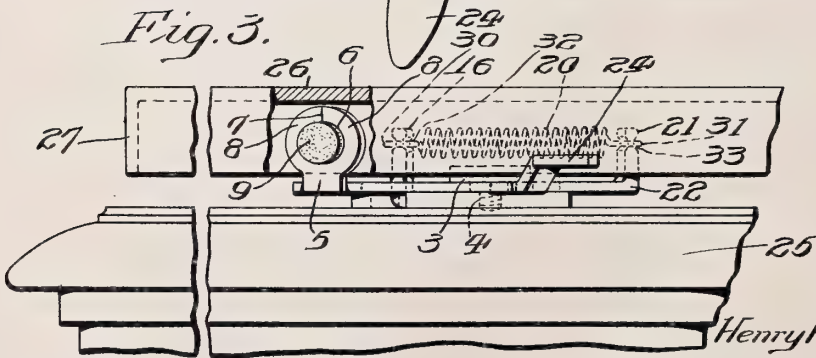


Fig. 3.



WITNESSES

H. J. Hartman.
A. J. Gardner.

BY

10/11/16

INVENTORS

Henry H. Murray.
William D. LaRue.

ATTORNEY

UNITED STATES PATENT OFFICE.

HENRY H. MURRAY, OF RIVERTON, AND WILLIAM D. LA RUE, OF CAMDEN, NEW JERSEY, ASSIGNORS TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

BRAKE FOR TALKING-MACHINES.

1,196,265.

Specification of Letters Patent. Patented Aug. 29, 1916.

Application filed February 1, 1912. Serial No. 674,738.

To all whom it may concern:

Be it known that we, HENRY H. MURRAY and WILLIAM D. LA RUE, both citizens of the United States, and residents of Riverton, county of Burlington, and State of New Jersey, and city of Camden, county of Camden, and State of New Jersey, respectively, have invented certain new and useful Improvements in Brakes for Talking-Machines, of which the following is a specification.

The main objects of this invention are to provide a simple and effective brake adapted for use in talking machines; to provide in combination with a turntable having an annular flange, an improved brake arranged beneath the turntable and adapted to engage the inner surface of said flange; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a top plan view of a brake constructed in accordance with this invention, and in its operative position with respect to the turntable of a talking machine, the turntable being shown in fragmentary horizontal section; Fig. 2 a similar view of the same showing the brake in its inoperative position; and Fig. 3 a fragmentary elevation of the same.

Referring to the drawings, one embodiment of this invention includes a flat base plate 1, preferably made of a sheet of mild malleable steel or other similar material, and adapted to be secured to any fixed support. Superimposed upon the plate 1 is a lever 2, preferably made of a sheet or plate of the same material as the base plate 1, and having a substantially flat main portion. This lever 2 is pivotally connected to the base plate 1 by means of a pivot 3, which extends through the lever 2 and is threaded into the base plate 1, as at 4, or which may be riveted or otherwise rigidly secured to the base plate 1 in any suitable manner.

The lever 2 has a transverse extension 5, which is bent upwardly in a plane substantially at right angles to the main portion of the lever and is perforated with a substantially circular opening 6, and the wall surrounding the opening is bifurcated or split radially as at 7 above the circular opening to form two oppositely disposed segmental jaws. Clamped between these jaws 8 is a cylindrical friction pad or shoe 9, preferably made of yielding material such as leather or

other suitable material, the pad or shoe being slightly compressed intermediate of its ends by the jaws forming a shallow annular groove 10 in which the jaws 8 engage to hold the pad securely in position.

Between the friction pad 9 and the pivot 3, the lever 2 is increased in width, and is provided with a segmental slot 15 coaxial with the pivot 3. In the slot 15 engages a fixed stop 16, which is preferably formed by bending upwardly into a plane substantially perpendicular to the main portion of the base plate, an extension of the base plate 1. This stop 16 projects above the lever 2 and is adapted to limit the movement of the lever 2 about its pivot 3, and to determine the normal inoperative position of the lever 2 by engaging against the corresponding end wall 17 of the slot 15.

For moving or "snapping" the brake pad 9 into operative position against the movable member, and for holding the brake pad either in operative position or in an inoperative position determined by the fixed stop 16, there is provided yielding means, which in this instance is in the form of a spiral spring 20, one end of which is secured to the upper end of the fixed stop 16, and the other end of which is secured to an upwardly bent end 21 of an arm 22, projecting from the lever 2 in a plane therewith, and integral or rigid therewith. The free end 21 of the arm 22 is arranged on the side of the pivot 3 opposite the stop 16, and so that when the lever 2 is in an inoperative position against the stop 16, there will be a slight tendency on the part of the spring to hold the lever in this position, but so that when the lever 2 is moved from its inoperative position against the stop 16, toward an operative position, the line of action of the spring will be moved accordingly from one side of the axis of oscillation of the lever to the opposite side, passing through this axis momentarily during this movement. When the line of action of the spring intersects the axis of the lever 2, the spring will not tend to move the lever in either direction, and in this position the spring may be considered to be upon a "dead line", and the lever 2 upon a "dead center."

For moving the brake lever 2 manually about the pivot 3, an actuating arm 23 projects laterally from the lever 2, integral or

rigid therewith, and preferably in a direction substantially radial with respect to the pivot 3. The outer end of the arm 23 may be enlarged as at 24 to form a suitable handle.

This improved brake is shown as applied to a talking machine, comprising the usual or any suitable cabinet 25, upon which is mounted a horizontal rotary turntable or disk record support 26. The turntable 26 is spaced above the cabinet 25, and is provided with a downwardly projecting marginal flange 27, integral or rigid therewith. The brake, with the exception of the outer portion of the actuating arm 23, is arranged beneath the turntable and surrounded by the marginal flange 27, the base plate 1 being rigidly secured to the top of the cabinet 25 by means of screws 28, or in any other suitable manner, and the brake pad 9 being arranged to be thrown in a horizontal plane into and out of contact with the inner surface of the flange 27. The actuating arm 23 and its handle 24 project outwardly from the flange 27 of the turntable, the arm 23 being freely movable in a horizontal plane beneath the lower edge of the flange 27.

The arrangement and construction are such that a slight movement of the handle 24 will throw the brake lever from an inoperative position against the fixed stop 16 to an inoperative position out of contact with the stop where the line of action of the spring 20 will be upon a "dead line," and further slight movement of the handle 24 in the same direction will move the free end 21 of the arm 22, so that the line of action of the spring 20 will be spaced inside of the axis of oscillation of the lever and the spring will be in a position to move or snap the brake pad 9 into engagement with the inner surface of the flange 27, the brake pad being movable through a greater angle from the dead line position of the spring into operative position than it is movable from the "dead line" of the spring into an inoperative position, determined by the fixed stop 16. It is therefore apparent that only a very slight amount of movement of the handle 24 in one direction will be necessary to throw the brake pad 9 from an inoperative position into an operative position against the flange 27, and that a greater, and considerable, amount of movement of the handle 24 in the opposite direction will be necessary to throw the pad from an operative position into an inoperative position where it will be retained by the spring. Any liability of the brake being accidentally thrown into the latter position from an operative position is therefore reduced to a minimum.

The segmental slot 15 is so proportioned that when the friction pad 9 is in operative position against the flange 27 of the turn-

table 26, the inner end wall 29 of the slot 15 will be spaced inwardly a short distance from the fixed stop 16, as shown in Fig. 1, and would prevent an excessive displacement or disarrangement of the friction pad 9 and its lever 2, under the influence of the spring 20, if the turntable 26 should be removed for any reason, or if the brake as a whole should be removed from the cabinet 25.

The distance between the fixed stop 16 and the inner end wall 29 of the slot 15, when the pad 9 is in operative position, is preferably merely sufficient to permit the friction pad 9 to be held in continuous engagement with the inner surface of the flange 27 by the force of the spring, and to provide the necessary amount of play to compensate for the gradual wearing away of the friction pad when in operation.

To hold the spring 20 securely in position between the fixed stop 16 and the end 21 of the arm 22, and at the same time to permit of the free oscillation of the spring about the fixed stop 16 without buckling, the ends of the spring 20 are bent to form two terminal circular eyes 30 and 31, and the upper end of the fixed stop 16 and the upper end 21 of the arm 22 are provided with corresponding annular grooves 32 and 33 in which the terminal eyes of the spring engage respectively.

In the preferred form of the invention, shown in the drawings, the arrangement and construction are such that the brake pad 9 when in operation exerts a dragging action upon the turntable, the turntable rotating in the direction indicated by the arrow in Fig. 1, and the pad 9 being spaced from the pivot 3 in the direction in which the adjacent portion of the turntable is rotating. The spring 20 is at all times under tension, and when the brake pad 9 is in operative position (as shown in Fig. 1) the spring holds the pad against the inner cylindrical surface of the flange 27 with sufficient force to retard the rotation of the turntable gradually, and eventually to stop the same without any abrupt or jarring action, such as is incident to some brakes and which would tend to injure the machine. In stopping the turntable, the force of the spring may, however, be supplemented by pressure applied manually or otherwise upon the handle 24.

Although only a single form has been described in which this invention may be embodied, it is to be understood that the invention is not limited to any specific construction, but might be embodied in various forms to meet various requirements, without departing from the spirit of this invention or the scope of the appended claims.

Having thus described this invention, we claim and desire to protect by Letters Patent of the United States:

1. A brake comprising frictional means mounted to oscillate about a fixed axis, a fixed stop arranged to limit the movement of said frictional means away from an operative position, and yielding means secured to said stop and to said frictional means for holding said frictional means either in an inoperative position or in an operative position, said yielding means being normally under a tension tending to contract the same.

2. A brake comprising frictional means mounted to oscillate about a fixed axis, a fixed stop arranged to limit the movement of said frictional means away from an operative position, and yielding means secured to said stop and to said frictional means and arranged either to hold said frictional means in the inoperative position determined by said stop, or to "snap" said frictional means into and then to hold said means in an operative position, said yielding means being normally under a tension tending to contract the same.

3. A brake comprising frictional means mounted to oscillate about a fixed axis, a fixed stop arranged to limit the movement of said frictional means away from an operative position, and yielding means secured to said stop and to said frictional means and arranged either to hold said frictional means in the inoperative position determined by said stop or to "snap" said frictional means into and then to hold said means in operative position, said yielding means being arranged to act at all times in a straight line which oscillates about said stop as an axis from one side to the opposite side of the axis of oscillation of said frictional means, said yielding means being normally under a tension tending to contract the same.

4. A brake comprising a lever mounted to oscillate about a fixed axis and provided with a slot, a fixed stop projecting through said slot to limit the movement of said lever, and yielding means connecting said lever and said stop.

5. A brake comprising a lever mounted to oscillate about a fixed axis, a fixed stop arranged to determine the inoperative position of said lever, and yielding means secured to said lever and to said stop, said yielding means being normally under tension tending to contract the same.

6. A brake comprising a brake lever mounted to oscillate about a fixed axis and provided with a slot, a fixed stop engaging in said slot, and yielding means connected to said lever and to said stop at points upon opposite sides of said axis respectively.

7. A brake comprising a lever mounted to oscillate about a fixed axis, a brake shoe carried by said lever, a fixed stop between said axis and said shoe, and yielding means

connecting said stop and said lever at points upon opposite sides of said axis respectively.

8. The combination with a rotary member provided with an annular flange, of a brake including a brake shoe, a lever carrying said shoe and mounted to oscillate about a fixed axis, a fixed stop arranged to limit the movement of said shoe away from flange, and yielding means secured to said stop and to said lever to hold said lever either in operative or in inoperative position, said yielding means being normally under a tension tending to contract the same.

9. A brake comprising frictional means mounted to oscillate about a fixed axis, a fixed stop arranged to limit the movement of said frictional means away from an operative position, and yielding means secured to said stop and to said frictional means at points upon opposite sides of said axis respectively for holding said frictional means either in an inoperative position or in an operative position.

10. A brake comprising frictional means mounted to oscillate about a fixed axis, a fixed stop arranged to limit the movement of said frictional means away from an operative position, and yielding means secured to said stop and to said frictional means and normally held extended to hold said frictional means either in an inoperative position or in an operative position.

11. A brake comprising frictional means mounted to oscillate about a fixed axis, a fixed stop arranged to limit the movement of said frictional means away from an operative position, and yielding means secured to said stop and to said frictional means at points upon opposite sides of said axis respectively, and normally held extended to hold said frictional means either in an inoperative position or in an operative position.

12. A brake comprising frictional means mounted to oscillate about a fixed axis, a fixed stop arranged to limit the movement of said frictional means away from said operative position and yielding means secured to said stop and to said frictional means at points upon opposite sides of said axis respectively and arranged either to hold said frictional means in an inoperative position determined by said stop or to "snap" said frictional means into and then to hold said means in operative position, said yielding means being arranged to act at all times in a straight line which oscillates about said stop as an axis from one side to the opposite side of the axis of oscillation of said frictional means.

13. A brake comprising a frictional means mounted to oscillate about a fixed axis, a fixed stop arranged to limit the movement of said frictional means away from an op-

erative position, and yielding means secured to said stop and to said frictional means and normally held extended, said yielding means being arranged to hold said frictional means in an inoperative position determined by said stop, or to "snap" said frictional means into and then to hold said frictional means in operative position, said yielding means being further arranged to act at all times in a straight line which oscillates about said stop as an axis from one side to the opposite side of the axis of oscillation of said frictional means.

14. A brake comprising a lever mounted to oscillate about a fixed axis, a fixed stop arranged to hold said lever in an inoperative position, and yielding means connected to said lever and to said stop at points upon opposite sides of said axis respectively.

15. A brake comprising a lever mounted to oscillate about a fixed axis, a fixed stop arranged to hold said lever in an inoperative position, and yielding means connected to said lever and to said stop at points upon opposite sides of said axis respectively, said yielding means being held extended to pull said lever into an operative position.

16. The combination with a rotary member provided with an annular flange, of a brake comprising frictional means arranged to engage the inner surface of said flange, a fixed stop arranged to limit the movement of said frictional means away from said flange, yielding means secured to said stop and to said frictional means and operative to hold said frictional means in an inoperative position determined by said stop, or to hold said frictional means in an oper-

ative position against the inner surface of said flange, and means extending outside of said flange for actuating said brake.

17. The combination with a member provided with an annular flange arranged to rotate in a predetermined direction, of a brake comprising frictional means mounted to oscillate about a fixed axis and arranged to engage the inner surface of said flange at a point spaced from said axis in said direction, a fixed stop arranged to limit the movement of said frictional means away from said flange, and yielding means secured to said stop and to said frictional means and operative to hold said frictional means in an inoperative position determined by said stop, or to hold said frictional means in an operative position against the inner surface of said flange.

18. In a brake, the combination of a base plate, a brake lever pivoted on said base plate to oscillate into and out of operative position, a pin and slot connection between said base plate and said brake lever to limit the oscillation of the latter, and yielding means connected to said base plate and said brake lever, respectively, at points on opposite sides of the pivotal axis of said brake lever, one of said connecting points being said pin.

In witness whereof we have hereunto set our hands this 26th day of January, A. D. 1912.

HENRY H. MURRAY.
WILLIAM D. LA RUE.

Witnesses:

J. L. STEWART,
J. D. MYERS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

NON-RESONANT MUSIC CABINET,
#1,196,366-----A.D. Jones,
Patented-Aug. 29th, 1916.
Filed-Nov. 27th, 1915.

A. D. JONES.
NON-RESONANT MUSIC CABINET.
APPLICATION FILED NOV. 27, 1915.

1,196,366.

Patented Aug. 29, 1916.

Fig. I.

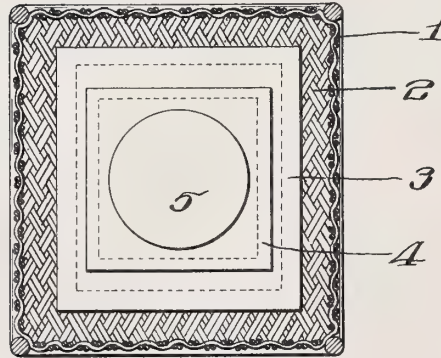
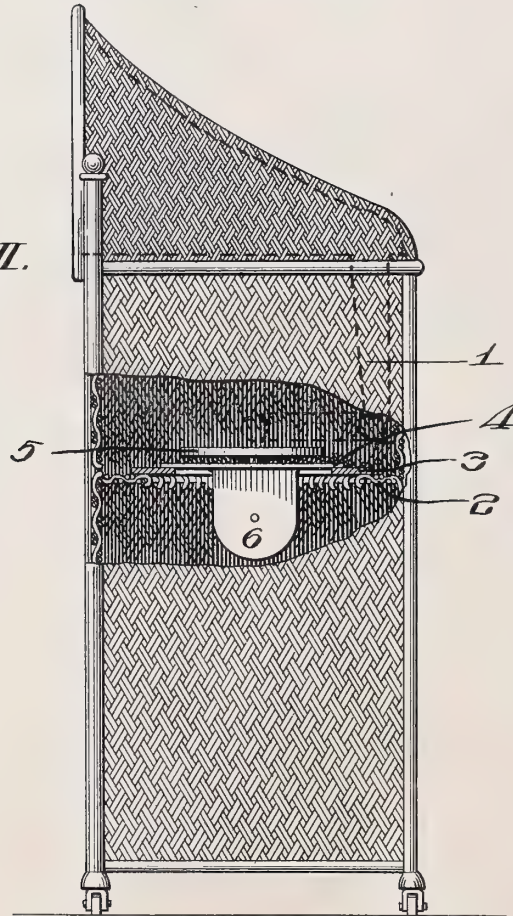


Fig. II.



INVENTOR

A. D. Jones.

UNITED STATES PATENT OFFICE.

ALVA D. JONES, OF PHILADELPHIA, PENNSYLVANIA.

NON-RESONANT MUSIC-CABINET.

1,196,366.

Specification of Letters Patent.

Patented Aug. 29, 1916.

Application filed November 27, 1915. Serial No. 63,784.

To all whom it may concern:

Be it known that I, ALVA D. JONES, a citizen of the United States, residing in the city and county of Philadelphia and State of Pennsylvania, have invented a new and useful Non-Resonant Music-Cabinet, Particularly Adapted to be Used in Talking-Machines and other Sound Instruments, of which the following is a specification.

My invention relates to a novel construction of a talking machine cabinet, being formed of a non-resonant substance and preferably made from ratan, willow, or other reed substances.

It is a well known fact that the musical vibrations occurring in the talking machine as well as piano, are greatly marred by sympathizing and exciting to vibratory movement the supporting frame and body portion of these instruments. This is particularly undesirable in the case of the talking machine as this instrument has to deal with the reproduction of the human voice, the tonal quality of which is greatly varied in accordance with the various board parts of this instrument as it has been constructed in the past. After exhaustive tests I have found that on reproducing records of various tonal qualities and pitch, that on placing my hand on the wood parts of this instrument, the wood vibrates to a very considerable degree, and that the various sounds coming from the record sympathize with various boards going to make up this cabinet. For example, a very high pitch will sympathize with a certain board,—a very low pitch with a different tonal quality will sympathize with a separate panel of the wood work depending upon whether this particular panel or board is to a greater degree in sympathetic vibratory accordance with a respective sound coming from the record. The above facts are well known and it is useless to exhaustibly detail the various sympathetic relations which are known to exist between resonant vibratory elements, but in my new construction of a talking machine cabinet, I have used a non-resonant but yet vibratory substance, which is not capable of changing the speed of vibrations coming from the record or in any way adulterating them. In accomplishing this function in a talking machine cabinet, I have found that reed, properly plaited or woven is extremely attractive, light, and more durable than wood of the board formation.

My invention further consists of other

novel features, all as will hereinafter be fully set forth.

For the purpose of illustrating my invention I have shown in accompanying drawings, one form thereof, which is at present preferred by me since the same will be found to give absolute satisfaction and reliable results in practice, although it is to be understood that the various instrumentalities of which my invention consists may be variously arranged and organized, and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 is a plan view of my new construction of a talking machine cabinet taken through the central portion of said cabinet, showing the motor and turn table mounted on a plaited non-resonant ledge. Fig. 2 shows a side elevation of my new talking machine cabinet, partly in section, showing a motor and turn table mounted thereon.

Referring to the drawings, 1 represents a part of the body portion of my non-resonant talking machine cabinet, 2 represents an inwardly extending ledge made of plaited material having the function of being non-resonant upon which is mounted the frame work 3 which supports the motor table 4, which has mounted upon it a turn table 5.

Fig. 2—1 represents the body portion of my talking machine cabinet, which body portion carries the ledge 2 which supports the frame 3, which has mounted upon it the frame work 4 which carries the turn table 5 and the motor 6.

I do not wish to limit my novel non-resonant cabinet to any particular use, as the same may be extremely useful in piano construction, or the supporting stand of a telephone, and I therefore reserve the right to use this sort of a construction in any acoustical instrument, wherein a sympathetic resonant substance is undesirable, in conjunction with sound.

In Fig. 2, I have indicated, partly by dotted lines, a typical sound-box, tone-arm and horn, it being understood that any conventional or desired construction of such parts may be employed.

As I am the first in the art to produce a talking machine, support, case or cabinet incapable of sympathetic sound vibration, or, in other words, having no inherent fundamental tone of its own, and preferably made from reed, ratan, cane, willow, wicker,

or their equivalent, suitably assembled or plaited or woven, in combination with any character of sound reproducing mechanism, such as for example, the sound-box, tone-arm, turn table, motor and their adjuncts, my claims to these features are to be interpreted with the corresponding scope awarded to inventions of this character.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. The combination with a sound reproducing mechanism, of a cabinet made of reed and incapable of sympathetic sound vibration and inclosing the sound reproducing mechanism.

2. The combination with the reproducing mechanism of a talking machine, of a support and inclosure therefor composed of plaited or woven reed, ratan, cane, or similar elements and incapable of sympathetic sound vibration.

3. The combination with a talking machine, of a cabinet for said talking machine inclosing the latter and composed of reed, ratan, cane or similar elements associated in such a manner as to form a cabinet body incapable of sympathetic sound vibration.

4. The combination of a cabinet having no inherent fundamental tone, and com-

posed of reed, ratan, cane or similar elements, and sound reproducing mechanism within the cabinet.

5. The combination of a cabinet having no fundamental tone of its own, composed of reed, cane ratan, cane or similar elements, and provided with a ledge having no fundamental tone of its own, of sound reproducing mechanism supported on said ledge.

6. The combination with sound reproducing mechanism, of a cabinet having its side walls formed of reed and provided with means within said side walls to support the sound reproducing mechanism.

7. The combination with a talking machine, of a case therefor, composed of reed, ratan, cane or similar elements, and having no inherent fundamental tone of its own, said case having a sound exit therefrom.

8. The combination with a talking machine, of a case therefor, composed of reed, ratan, cane or similar elements, and having no inherent fundamental tone of its own, said case having a sound exit inclosed within it.

ALVA D. JONES.

Witnesses:

VIRA B. CALDWELL,

VERNON STANTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TALKING MACHINE,
#1,196,448-----J. C. English;
Patented-August 29th, 1916.
Filed-March 24th, 1911.
Renewed--November 29th, 1913.

J. C. ENGLISH.
TALKING MACHINE.

APPLICATION FILED MAR. 24, 1911. RENEWED NOV. 29, 1913.

1,196,448.

Patented Aug. 29, 1916.

Fig. 1.

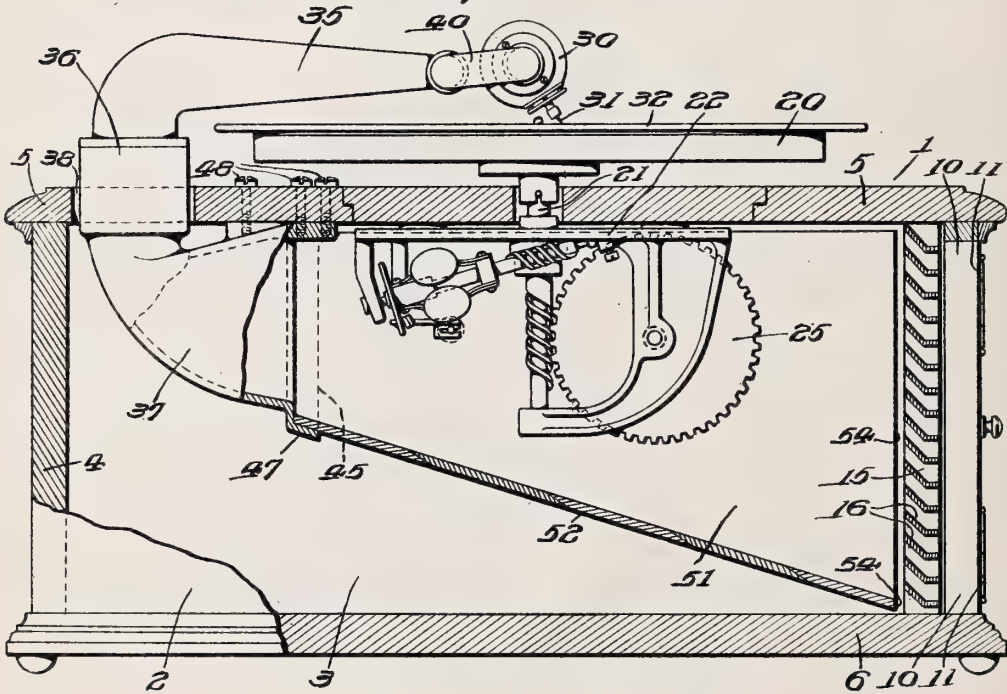
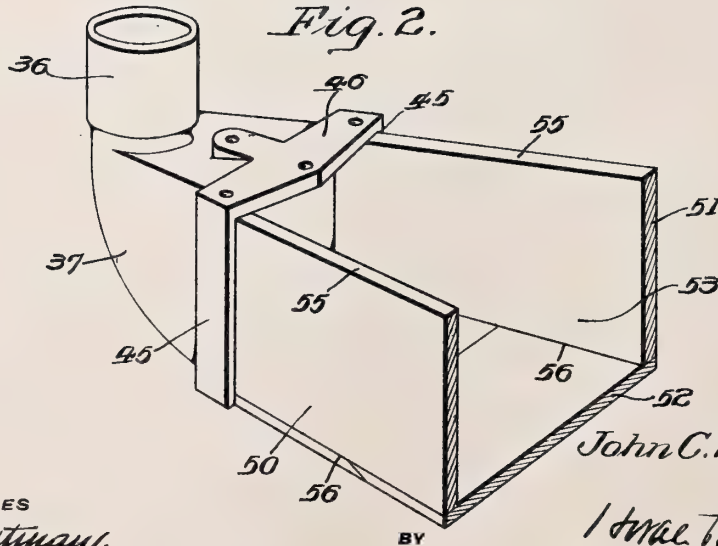


Fig. 2.



WITNESSES

F. J. Hartman.

A. J. Gardner.

INVENTOR

John C. English

BY

Wm. F. ...

ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

1,196,448.

Specification of Letters Patent.

Patented Aug. 29, 1916.

Application filed March 24, 1911, Serial No. 616,665. Renewed November 29, 1913. Serial No. 803,857.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, a resident of the city of Camden, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

This invention relates to certain new and useful improvements in talking machines as will be fully described hereinafter and particularly pointed out in the appended claims.

In the accompanying drawings Figure 1 is a side elevation partly in vertical central section of a talking machine constructed in accordance with this invention and Fig. 2 a fragmentary perspective of a portion of the same.

Referring to the drawings, one embodiment of this invention comprises a substantially rectangular cabinet or inclosure 1, including two vertical parallel side walls 2 and 3, a vertical back wall 4, a top horizontal wall 5 and bottom horizontal wall 6. These exterior walls of the casing are preferably made of wood and may be comparatively thick, as is usual in such cabinets to protect the inclosed mechanism. The front of this cabinet is closed by one or more vertical doors 10 connected to the side walls of the cabinets by hinges 11, to swing outwardly as is usual.

A vertical screen 15 is arranged within the cabinet adjacent and parallel to the doors 10 when closed. This screen comprises a plurality of vertically spaced horizontally extending slats 16 which are constructed and arranged to conceal the interior of the cabinet from view when the doors 10 are open, but to permit of the free transmission of sound waves outwardly through the spaces between the slats. The screen extends horizontally the full distance between the side walls 2 and 3, and vertically the full distance between the top wall 5 and the bottom wall 6 of the cabinet.

A horizontal turn-table 20 is arranged above the top wall 5 of the cabinet and is rotatively mounted upon the upper end of a vertical spindle 21 which projects freely through the central portion of the upper wall 5 and extends downwardly into the interior of the cabinet. This spindle 21 is rotatively mounted in a frame 22 depending

from the central portion of the vertical wall 5.

For actuating the turn-table 20, suitable mechanism 25 is arranged within the cabinet preferably depending from the frame 22 and is operatively connected to the spindle 21.

A sound box or sound reproducer 30 of any well-known or suitable construction is arranged above the turn-table 20. This sound box carries, as usual, a stylus 31 adapted to coöperate with a record 32 carried by the turn-table.

For supporting the sound box 30 to swing horizontally across the face of the record 32 and to be vertically movable into and out of operative position with respect to the record, the sound box is movably connected to the free end of a hollow tone arm 35 with which it communicates. The outer end of the tone arm 35 is rotatively connected to the upper hollow cylindrical end 36 of a downwardly extending hollow rigid bracket 37 which extends from above the cabinet freely downwardly through an aperture 38 provided therefor in the top wall 5 of the cabinet, the major portion of the bracket being inclosed or surrounded by the cabinet and rigidly secured to the under surface of the top wall 5 in any suitable manner.

In the construction illustrated, the sound box 30 is connected to one end of a tube 40, the other end of which is pivotally connected on a horizontal axis with the free end of the tone arm 35 with which the sound box communicates through the tube 40. The tone arm preferably tapers about a horizontal axis outwardly toward its free end and the inner larger end of the tone arm is preferably turned downwardly through an arc of 90 degrees and terminates in a cylindrical end which is rotatively connected in any well known or suitable manner on a fixed vertical axis with the upper cylindrical end of the hollow bracket 37 with which it communicates.

The hollow bracket 37 is preferably unitary and comparatively rigid, being made of cast iron or other similar material and having comparatively thick walls. The bracket flares downwardly and then forwardly within the cabinet substantially in the form of an elbow curved longitudinally through an arc of substantially 90 degrees and terminates at its larger end in a transversely rec-

tangular and forwardly flaring socket integral therewith. This socket comprises two vertical horizontally spaced flanges or walls 45 which diverge forwardly and the upper

ends of which are connected by a horizontal flange or plate 46, and the lower ends of which are connected by a longitudinally horizontal flange 47 which is inclined transversely downwardly in a forward direction. The bracket 37 is preferably rigidly clamped to the inner surface of the top wall 5 by means of screws 48 extending downwardly through the wall and threaded into the horizontal flat upper surface of the flange 46 of the bracket, the flange being extended to form a suitable flat base for this purpose.

For amplifying the sound waves within the cabinet 1 after they are transmitted from the sound box through the hollow bracket 37, three sounding boards 50, 51 and 52 are entirely supported by the hollow bracket 37 and extend freely within the cabinet 1 upon three sides respectively of the actuating mechanism 25, forming a tapering channel 53 in which the actuating mechanism depends. This channel 53 is rectangular and substantially U-shaped in cross section and its longitudinal axis is inclined downwardly in a forward direction and lies in a vertical plane parallel to the side walls 2 and 3 of the cabinet.

The three sounding boards 50, 51 and 52 extend from the hollow bracket 37 forwardly and are supported entirely by the socket at the forward end of the bracket. The front end edges 54 of these three boards lie in a vertical plane parallel to and slightly in the rear of the plane of the inner surface of the screen 15. Two, 50 and 51, of these sounding boards extend in vertical planes diverging forwardly from the hollow bracket 37, the rear edges of these boards being secured against the inner surfaces of the vertical flanges 45 of the bracket respectively in any suitable manner, and these boards forming the side walls of the channel 53. The upper edges 55 of these diverging side walls are preferably substantially parallel to and spaced slightly below the under surface of the top wall 5 of the cabinet, and their lower edges 56 are preferably inclined forwardly and downwardly and terminate at their front ends slightly above the upper surface of the bottom wall 6 of the cabinet. The other sounding board, 52, abuts against and connects the lower edges of the two vertical sounding boards 50 and 51 to which it is secured in any suitable manner, forming the bottom of the channel 53. This latter sounding board 52 is secured at its rear edge against the upper surface of the lower flange 47 of the hollow bracket 37 and terminates at its front edge slightly above the bottom wall 6 of the cabinet and slightly in

the rear of the inner surface of the screen 15. By this construction the sounding boards 50, 51 and 52 are secured to the bracket at their rear edges only, and project freely within the cabinet from the hollow bracket 37, the hollow bracket 37 thus forming the sole support for the three sounding boards 50, 51 and 52, and also, as hereinbefore described, forms the sole support for the hollow tone arm 35 to which the sound box 30 is pivoted. The hollow bracket 37 is also supported at one end only, as hereinbefore described. This arrangement also provides a sound reproducer in combination with a sound amplifier comprising the tapering tone arm 35, the hollow flaring bracket 37 and the sounding boards 50, 51 and 52 which are, with the exception of the single flange 46 of the hollow bracket, out of contact with any part of the cabinet and are free to respond more readily to sound vibrations than would otherwise be the case.

As all of the advantages and all of the theories in respect to this device may not be fully understood at this time, applicant reserves the right to supplement this disclosure by further statements in this respect, should this be found desirable.

Although only a single form has been illustrated in which this invention may be embodied, it is obvious that the invention is not limited to the particular construction shown, but may be applied in other forms to meet various conditions, without departing from the spirit of this invention or the scope of the appended claims.

Having thus fully described this invention, I claim and desire to protect by Letters Patent of the United States:

1. The combination with a cabinet, of a hollow longitudinally tapering bracket secured at its larger end to said cabinet and having its major portion inclosed by said cabinet, and a sound box arm communicating with and entirely supported by the smaller end of said bracket, the said bracket and said sound box arm forming a sound conduit projecting freely through a wall of said cabinet.

2. A talking machine comprising a cabinet, a hollow bracket extending freely through a wall of said cabinet and having its major portion inclosed by and secured to said cabinet, and a sound box arm arranged outside of said cabinet and communicating with and entirely supported by said bracket.

3. A talking machine comprising a cabinet, a hollow bracket extending freely through a wall of said cabinet and having its major portion inclosed by and secured to said cabinet, a sound box arm arranged outside of said cabinet and communicating with and entirely supported by said bracket and sound amplifying means arranged within

said cabinet and entirely supported by said bracket.

4. A talking machine comprising a cabinet, a hollow bracket secured to a wall of said cabinet and having its major portion inclosed by said cabinet and a sound box arm and sound amplifying means entirely supported by and communicating with each other through said bracket, and forming therewith a sound conduit projecting freely through said wall.

5. A talking machine comprising the combination with a cabinet, of hollow sound amplifying means extending within said cabinet and having an open side extending longitudinally of said means and arranged adjacent to, but spaced from a wall of said cabinet.

6. A talking machine comprising the combination with a cabinet including a substantially horizontal top wall of sound amplifying means arranged within said cabinet, said means having an open side facing and spaced from said top wall and an open delivery end arranged transversely of said open side.

7. In a talking machine the combination with an inclosure, of hollow sound amplifying means extending within said inclosure, said means comprising three sounding boards arranged to form a channel having an open side through which said channel communicates with the space surrounding said means, and an open delivery end.

8. A talking machine comprising an inclosure provided with an outlet in one wall thereof, and hollow sound conducting means extending within said inclosure and arranged to transmit sound waves through said outlet, said sound conducting means having an open side extending longitudinally thereof and facing and spaced from a wall of said inclosure.

9. A talking machine comprising an inclosure, a hollow bracket extending freely through a wall of said inclosure and secured to and having its major portion within said inclosure, hollow sound amplifying means carried by said bracket, a rotary record support outside of said inclosure, sound reproducing means arranged to cooperate with said support and communicating with said sound amplifying means through said bracket, and actuating mechanism for said support within said amplifying means.

10. A talking machine comprising an inclosure including a front upwardly extending wall provided with an outlet, hollow sound conducting means arranged within said inclosure to transmit sound waves through said outlet and having an open side facing another wall of said inclosure and spaced therefrom, sound reproducing means arranged outside of said inclosure and communicating with said sound conducting

means, a rotary record support outside of said inclosure, actuating mechanism arranged within said inclosure in said sound conducting means and operatively connected to said support, and a screen arranged in said outlet to conceal said actuating mechanism.

11. In a talking machine, the combination with a cabinet providing a compartment, of a sound amplifier inclosed in said compartment and including a quadrangular sounding-board restrained at two meeting edges and having two meeting edges free.

12. The combination with a cabinet providing a compartment, of sound amplifying means inclosed in said compartment and including a sounding-board having a free longitudinal edge and a free transverse edge, and sound reproducing means communicating with said sound amplifying means.

13. In a talking machine, the combination with a cabinet providing a compartment, of a hollow longitudinally tapering bracket secured at its larger end to said cabinet and having its major portion inclosed in said compartment, and a hollow sound box arm mounted to oscillate on and communicating with the smaller end of said bracket, and forming with said bracket a sound conduit projecting freely through a wall of said compartment.

14. In a talking machine, the combination with a cabinet providing a compartment, of a hollow bracket rigidly secured to said cabinet and providing an elongated sound passage, the major portion of said bracket being inclosed in said compartment, and a portion of said bracket projecting freely through an aperture provided therefor in a wall of said compartment, a hollow movable sound box arm arranged outside of said compartment and entirely supported by said bracket and communicating with said passage, and hollow sound amplifying means within said compartment and entirely supported by said bracket and communicating through said passage with said sound box arm.

15. In a talking machine, the combination with a cabinet providing a compartment, of a hollow longitudinally tapering bracket rigidly secured adjacent its larger end to said cabinet, the larger end of said bracket being arranged in said compartment and the smaller end of said bracket projecting freely through an exterior wall of said compartment, a hollow sound box arm outside of said compartment and mounted to oscillate on the smaller end of said bracket, and sound amplifying means extending within said compartment and communicating with the larger end of said bracket.

16. A talking machine comprising a casing, sound amplifying means terminating

in a delivery end projecting freely in the interior of the said casing and forming a sound conduit having an open side and an open end, and actuating mechanism for said machine located in said casing and in said conduit.

17. In a talking machine, the combination with a cabinet, of a hollow sound conducting and amplifying member comprising a swinging arm outside the cabinet, a bracket within said cabinet upon which said arm is mounted and supported, a hollow vibratory body supported on said bracket and ex-

tending in said cabinet, said sound conducting and amplifying member being attached to said cabinet at a point within said cabinet and substantially midway between its extreme ends, and a motor supported on said cabinet and extending into said hollow vibratory body.

In witness whereof I have hereunto set my hand this 17th day of March, 1911.

JOHN C. ENGLISH.

Witnesses:

FRANK B. MIDDLETON, Jr.,

A. I. GARDNER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

MEANS FOR AUTOMATICALLY STOPPING
GRAMOPHONES,

#1,196,672-----F. Ertuck,

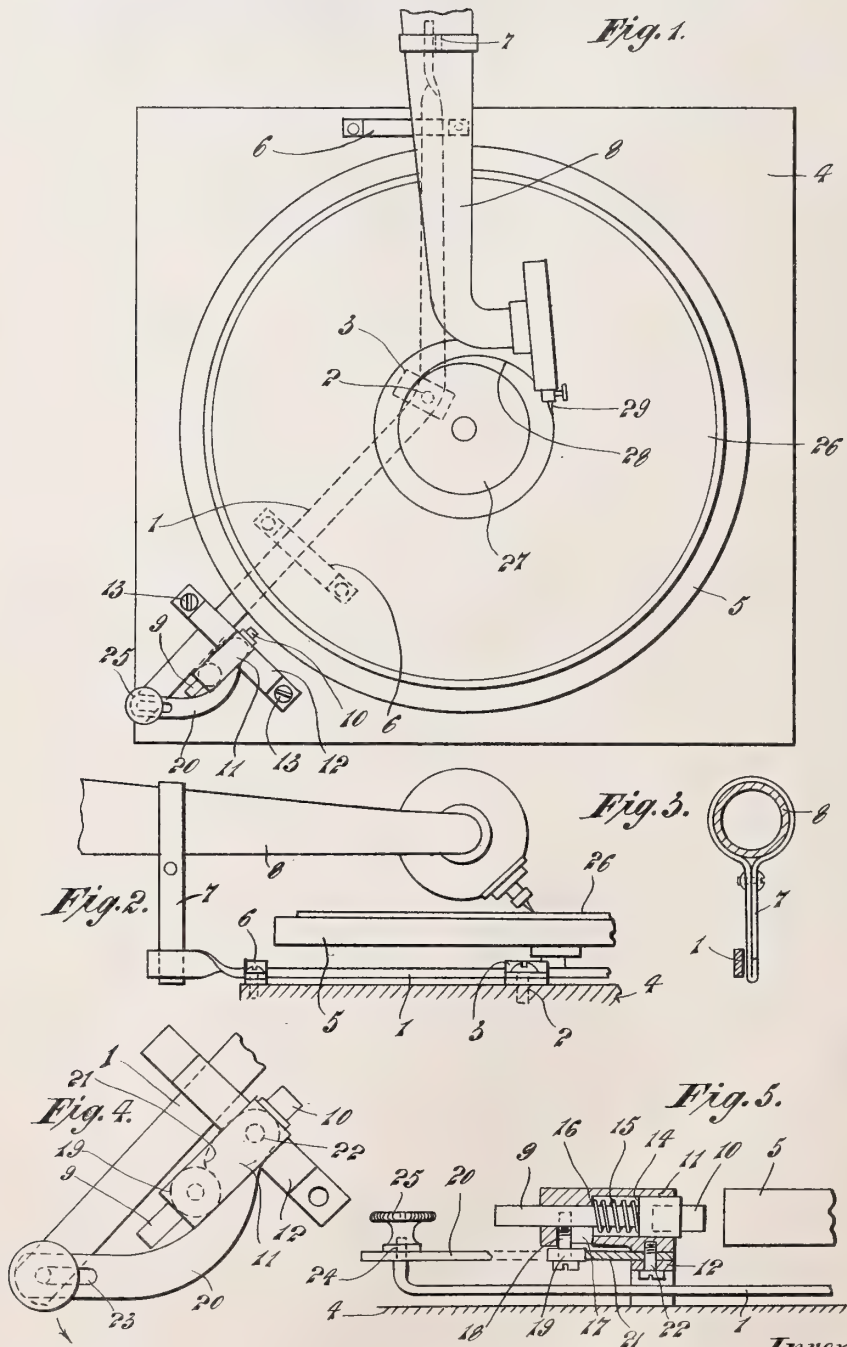
Patented-August 29th, 1916.

Filed-April 27th, 1915.

F. ERTUCK.
 MEANS FOR AUTOMATICALLY STOPPING GRAMOPHONES.
 APPLICATION FILED APR. 27, 1915.

1,196,672.

Patented Aug. 29, 1916.



Witnesses.
 Frank H. Hogan
 John A. Hoving

Inventor.
 Frederick Ertuck.
 BY: Frank Deane
 ATTORNEY.

UNITED STATES PATENT OFFICE.

FREDERICK ERTUCK, OF PETONE, NEAR WELLINGTON, NEW ZEALAND.

MEANS FOR AUTOMATICALLY STOPPING GRAMOPHONES.

1,196,672.

Specification of Letters Patent.

Patented Aug. 29, 1916.

Application filed April 27, 1915. Serial No. 24,201.

To all whom it may concern:

Be it known that I, FREDERICK ERTUCK, subject of the Emperor of Russia, residing at No. 400 Jackson street, Petone, near Wellington, New Zealand, have invented a new and useful Improvement in Means for Automatically Stopping Gramophones; and I do hereby declare the following to be a full, clear, and exact description of the same.

This invention relates to means for automatically stopping gramophones when the record is finished.

According to this invention, a member is pivoted beneath the turntable upon which the record disks are carried. The member is pivoted at or near its center to the top of the gramophone casing. Guides may be provided for guiding the ends of the member which is preferably of a bell crank type.

The rear end of the pivoted member is extended a required distance beyond the periphery of the turntable and against it an arm depending from the tone arm is adapted to strike. Upon the depending arm striking the rear end of the pivoted member the forward end of the said pivoted member will release a spring controlled buffer which will impinge against the periphery of the turntable and thereby stop said turntable by means of a brake action.

The invention will be fully illustrated in the accompanying drawings wherein:—

Figure 1 is a plan, and Fig. 2 a side elevation of a portion of a gramophone having the invention applied thereto. Fig. 3 is an end elevation of the striking arm. Fig. 4 is a detail plan, and Fig. 5 a sectional elevation of the stopping mechanism.

Referring to the drawings, the horizontal member 1 is pivoted at or near its center upon a pin 2 mounted in a bearing 3 fixed to the top of the gramophone casing 4. The member is arranged below the turntable 5 as clearly indicated and is preferably of a bell crank shape as shown. Guides 6 are provided in which the ends of the member are guided. The rear end of the member 1 is extended a sufficient distance beyond the turntable 5 so as to enable it to be operated by a striking arm 7 projecting downwardly from the tone arm 8. When the rear end of the member 1 is struck by the depending arm 7 the front end of the member 1 will operate and release a spring controlled brake buffer 9 having a buffer end 10 of leather or the like and so cause the

buffer to grip the periphery of the turntable 5 thereby stopping it.

The means intervening between the front end of the member 1 and the buffer will now be described. The buffer 9 is slidable in a sleeve 11 fixed to a bracket 12 which may be fastened to the top of the casing 4 by screws 13. A shoulder 14 is provided upon the front end of the buffer while a coil spring 15 in compression between this shoulder and a shoulder 16 formed upon the interior of the sleeve normally tends to project the buffer outward.

Depending from the buffer and through a slot 17 in the sleeve 11 is a pin 18 which carries a roller 19. A cam lever 20 having a cam face 21 is pivoted in the bracket 12 by a pin 22. This lever is extended in the manner shown in Fig. 4 and is provided with a slot 23 in its end. In this slot an integral pin 24 of the pivoted member 1 engages. A knob or button 25 is fixed upon the pin 24 for operating the device by hand.

In order to obtain a positive striking action against the rear end of the member 1 the record disks, one of which is designated by the numeral 26 in the drawings, are provided with central unoccupied portions 27 of uniform diameter while the phonic lines finish a suitable distance from this unoccupied portion. A groove 28 having a suitable curve starts from the point where the phonic line finishes and runs to the edge of the portion 27. This groove guides the stylus 29 rapidly in a transverse direction toward the center of the record disk. The transverse travel imparted to the tone arm by the above action causes the striking arm 7 to contact with the rear end of the member 1 and operate said member to release the buffer 9.

When starting the gramophone the buffer is set free from the turntable by hand and is held in that position by the cam face 21 of the lever 20 until such time as the pivoted member is operated by the depending arm 7. The lever will be thrown over in the direction indicated by the arrow in Fig. 4 thereby freeing the roller 19 from the inner face of the cam and allowing the buffer 9 to move forward under the pressure of the spring 15. Both the starting and stopping of the turntable may be effected by hand in the ordinary manner with this device.

I claim:—

1. The combination in a gramophone of a

turntable, a casing, a swinging member carried upon said casing, a striking arm depending from said swinging member, a horizontal member pivoted at or near its center
5 to the said casing below said turntable and adapted to be operated by the said striking arm, a lever having a curved face to which lever the front end of said pivoted member
10 is pivotally connected, a spring operated buffer, said lever adapted to retain said spring-operated buffer out of engagement with the turntable by the tension of said
15 spring operated buffer, and adapted to be disengaged from the tension of the buffer when the pivoted member is operated by the striking arm, substantially as set forth.

2. The combination in a gramophone of a casing, a turntable, a swinging member carried upon said casing, a striking arm depending from said swinging member, a horizontal member pivoted at or near its center
20 to the said casing, the rear end of said member projecting beyond the turntable and adapted to be operated by the said striking arm, a lever to which the front end of said
25 pivoted member is pivotally connected, a spring operated buffer carried in a sleeve fixed to the casing, a pin projecting from said spring operated buffer through said
30 sleeve, a roller pivoted upon said pin, said roller engaging upon a cam face in the said lever whereby said spring operated buffer is retained out of engagement with the turntable while the said roller is resting upon the

cam face of the said lever but whereby the
35 said buffer is projected forward under the pressure of its spring when the said roller is forced out of engagement with the cam face by said horizontal member and is projected
40 forward and engages the turntable, substantially as set forth.

3. In an automatic stop mechanism for gramophones, a casing, a turntable, a swinging member carried upon said casing, a striking arm depending from said swinging
45 member, a horizontal member pivoted at or near its center to the said casing, guides fixed to the casing in order to support the said horizontal member, the rear end of said member projecting beyond the turntable and
50 adapted to be operated by the said striking arm, a lever to which the front end of said pivoted member is pivotally connected, a spring operated buffer, said lever adapted
55 to retain said spring operated buffer out of engagement with the turntable and to allow the said buffer to be projected forward and engage the turntable when said pivoted member is operated by the striking arm, substantially as set forth.

60 In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

FREDERICK ERTUCK.

Witnesses:

EDMOND PATRICK O'DONNELL,
ROWENA WALL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TALKING MACHINE,
#1,196,899-----C.F.A. Sturts,
Patented-Sept. 5th, 1916.
Filed-Nov. 25, 1912.
Renewed-Aug. 4th, 1916.

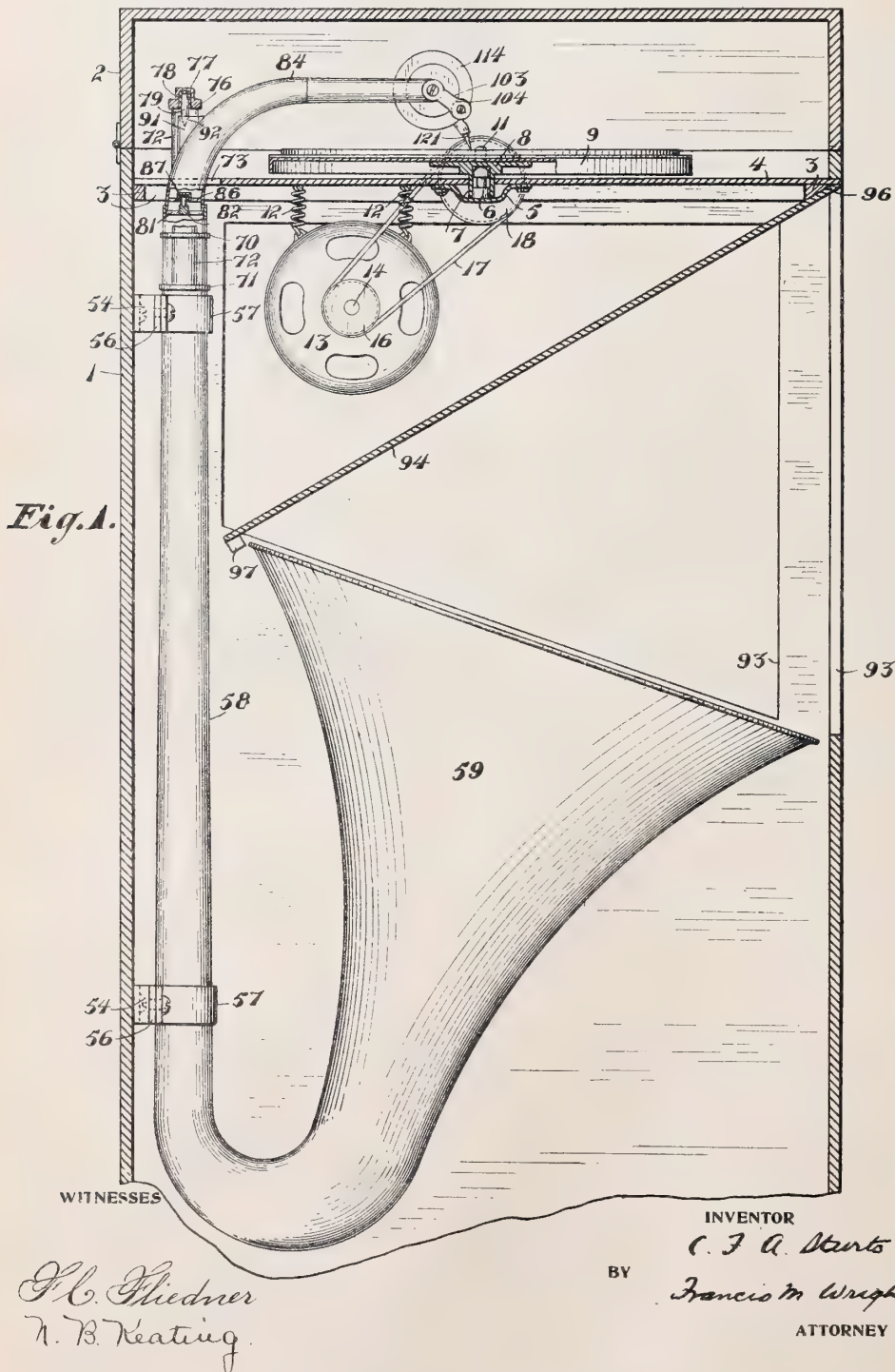
C. F. A. STURTS.
TALKING MACHINE.

APPLICATION FILED NOV. 25, 1912. RENEWED AUG. 4, 1916.

1,196,899.

Patented Sept. 5, 1916.

3 SHEETS—SHEET 1.





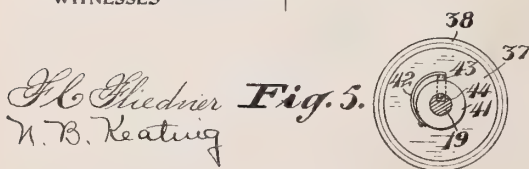
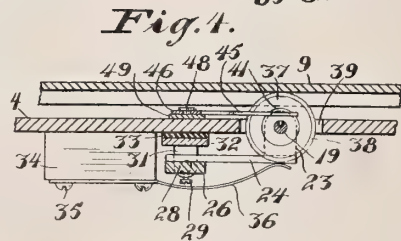
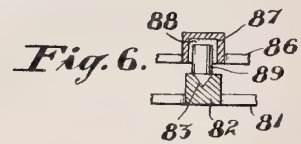
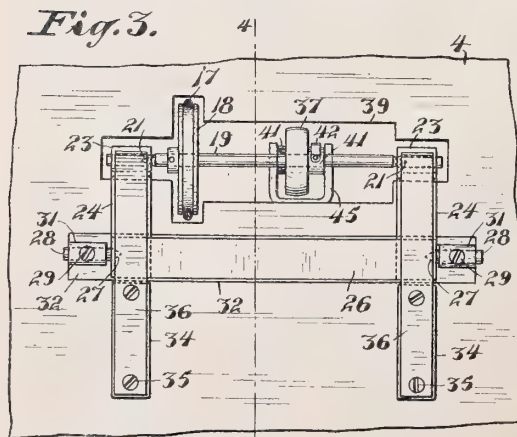
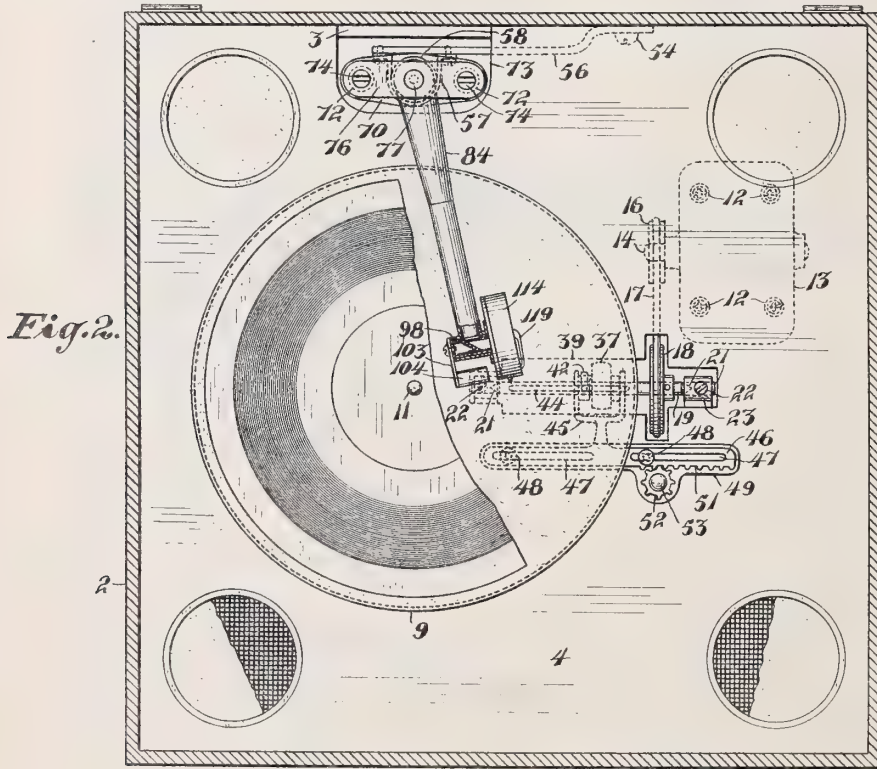
C. F. A. STURTS.
TALKING MACHINE.

APPLICATION FILED NOV. 25, 1912. RENEWED AUG. 4, 1916.

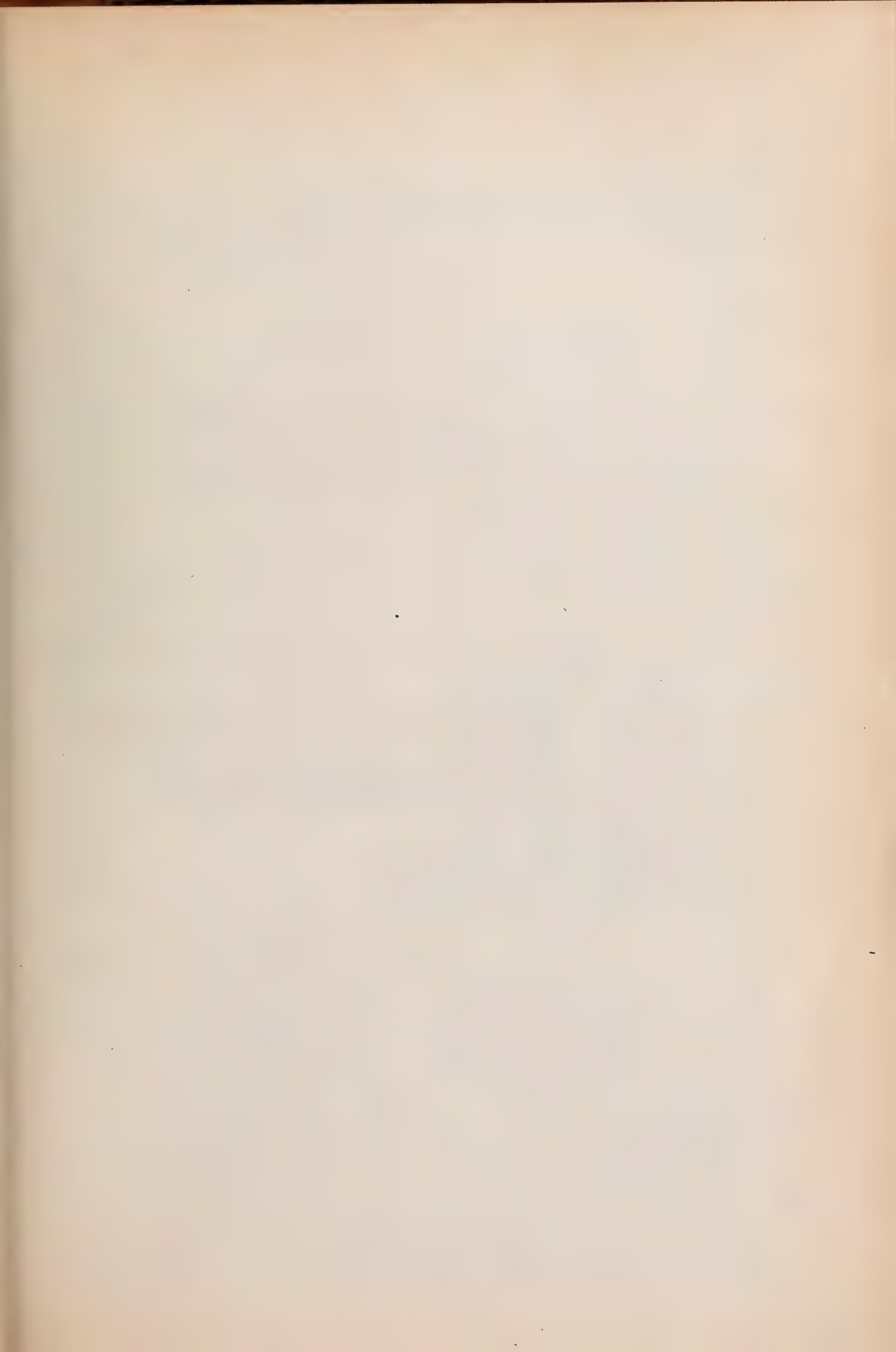
1,196,899.

Patented Sept. 5, 1916.

3 SHEETS—SHEET 2.



INVENTOR
C. F. A. Sturts.
BY
Francis M. Wright.
ATTORNEY



C. F. A. STURTS.
TALKING MACHINE.

APPLICATION FILED NOV. 25, 1912. RENEWED AUG. 4, 1916.

1,196,899.

Patented Sept. 5, 1916.

3 SHEETS—SHEET 3.

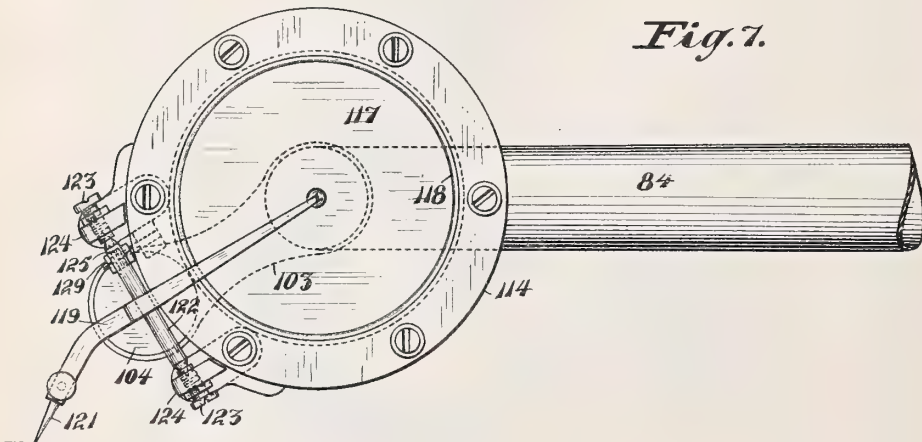


Fig. 7.

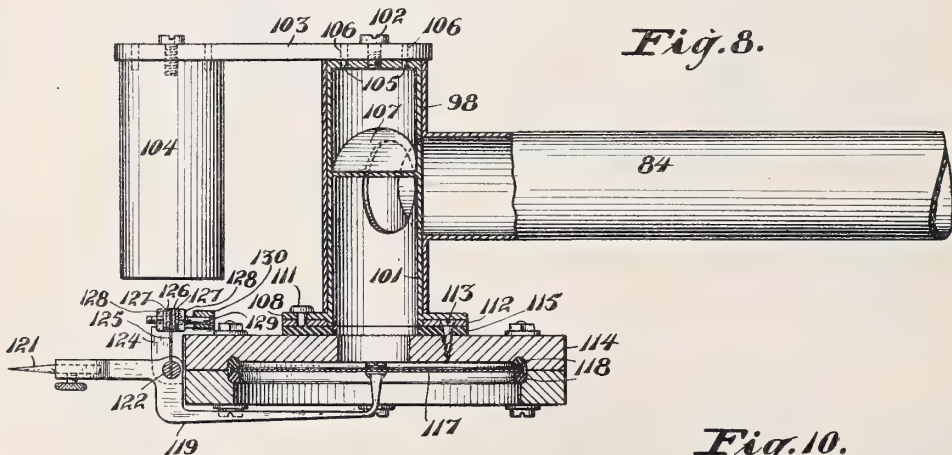


Fig. 8.

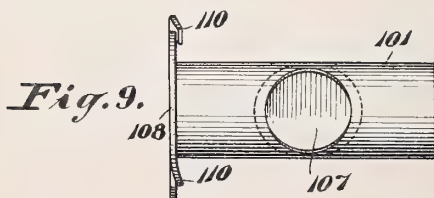


Fig. 9.

WITNESSES

J. C. Thiedner
A. B. Keating

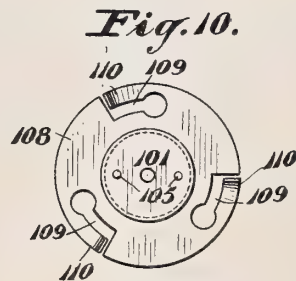


Fig. 10.

INVENTOR

C. F. A. Sturts

BY

Frances M. Wright

ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES F. A. STURTS, OF SAN FRANCISCO, CALIFORNIA.

TALKING-MACHINE.

1,196,899.

Specification of Letters Patent.

Patented Sept. 5, 1916.

Application filed November 25, 1912, Serial No. 733,316. Renewed August 4, 1916. Serial No. 113,205.

To all whom it may concern:

Be it known that I, CHARLES F. A. STURTS, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Talking-Machines, of which the following is a specification.

The present invention relates to improvements in talking machines, especially those of the disk type.

One object of the invention is to provide such a machine which will produce a fuller and better tone, and in which the scraping, metallic, and discordant sounds heretofore always, so far as I am aware, produced by talking machines are practically eliminated, and in which the sound waves produced by the diaphragm will not be checked or dampened in any way but will be sustained, thus reproducing the original sounds with great accuracy.

A further object is to provide such a machine in which the disk can be rotated at a substantially constant speed, by electricity, and in which therefore rewinding is not required.

A further object is to provide such a machine which will be inexpensive and convenient in operation.

In the accompanying drawing, Figure 1 is a broken vertical section of a cabinet, showing in side elevation, my improved talking machine therein; Fig. 2 is a broken horizontal section of the cabinet above the disk carrier; Fig. 3 is a broken bottom plan view of the table of the cabinet; Fig. 4 is a section thereof on the line 4—4 of Fig. 3; Fig. 5 is an enlarged cross-section of a shaft; Fig. 6 is an enlarged vertical section of a bearing; Fig. 7 is an enlarged side view of the sound box; Fig. 8 is a transverse section of the same in a different position, showing also a section of the end of the sound-conveying tube; Fig. 9 is a plan view, and Fig. 10 an end view of means for connecting the sound box and the conveying tube.

Referring to the drawing, 1 indicates the upper portion of a cabinet having hinged thereto a cover 2. Cleats 3 are secured to the sides of the cabinet at the top, and upon said cleats, is secured a table 4. To the under

side of the table at the center is secured a plate 5 carrying a central stud 6 which projects into a central hole in the table, and through said hole extends around said stud a tube 7 depending from a hub 8 secured to a circular record-carrier 9 of the usual form, provided with a central pin 11 adapted to pass into a central hole in a record in the usual manner. To the under side of this table are secured the upper ends of four springs 12, to the lower ends of which is attached the casing 13 of an electric motor receiving its electricity from any suitable source, not here shown. By suspending the motor from springs, the noise resulting from vibration of the motor is absolutely eliminated, and said vibration can in no way be detected, and does not in the least affect the desired reproduction of the sound by the talking machine. The shaft 14 of said motor carries a small pulley 16 around which travels a belt 17 which also travels around a large pulley 18 on a shaft 19, the ends of which are conical and rotate in conical bearings 21, adjustably secured by means of screws 22 in holes formed in the upper ends of standards 23 secured to the outer ends of arms 24. Said arms are secured to a bar 26, in the ends of which are formed conical bearings 27 in which are fitted conical pivot pins 28 adjustably secured by screws 29 in hangers 31 depending from a strip of metal 32 screwed to the under side of the table, a strip 33 of rubber being interposed between the strip 32 and the table. Blocks 34 are also secured to the under side of the table, and to the under side of said blocks are secured, each by screws 35, ends of flat springs 36, bent upward at their free ends, and each pressing against the under side of the free end of one of the arms 24. Upon said shaft 19 is adjustably secured, as hereinafter explained, a wheel 37, having a rubber tire 38, which, being pressed upward by the springs 36, contacts with the under side of the record carrier 9, the table being formed with a suitable slot 39 to permit said shaft 19, pulley 18, and wheel 37 to operate.

It has heretofore not been found practicable, so far as I am aware, to rotate the disk or record-carrier of a talking machine by an electric motor, for the reason that the

electric current supplied to the motor for so rotating it fluctuates greatly in magnitude and hence causes a variation in speed of the rotating disk, which in turn causes a variation in the rapidity of the vibrations, which therefore incorrectly reproduce the pitch of the original tones. I overcome this difficulty by the above described arrangement for rotating the disk from the motor, for it will be observed that, while the motor, which is of low-power, rotates at a high speed, the pulley 18 is of much greater diameter than the pulley 16 and therefore rotates at a lower speed, and the wheel 37 is of a much less diameter than the pulley 18 thus again reducing the speed of rotation. By reason of the circumference of the wheel 37 being much smaller than that of the part of the disk with which it is in contact, there is a still further reduction of the speed. In consequence the motor is obliged to make a considerable number of revolutions to each revolution of the disk. Since the transmission is not positive, but entirely frictional, the inertia of the record-carrier, rotating at a comparatively low speed, cannot be overcome, and the speed of the carrier varied, by rapid variations of the low-power motor, rotating at a high speed.

I have found that, with a transmission of the above described character, I can use an electric motor and an ordinary city current and obtain a speed of the disk having no perceptible variation.

For the purpose of varying the speed of the disk as desired, the wheel 37 is formed with hubs 41, on one of which is secured one end of a spring 42, the other end of which is secured to one end of a pin 43, which passes through a hole in the hub, the other end of the pin depending into a groove 44 extending longitudinally in the shaft 19. Straddling the wheel, and slightly engaging the outer sides of the hubs 41, is a fork 45 attached to, and extending from, a slide-piece 46, formed with two slots 47 which engage screws 48, screwed into a brass plate 49 secured upon the top of the table, one side of the slidepiece being formed with a rack 51 which is engaged by a small pinion 52 having a suitable bearing in said brass plate, and having a knob or handle 53, by which it may be turned. By turning said pinion the rack is moved, correspondingly moving the fork and the wheel 37, to vary the rate at which rotation is transmitted from the motor to the rotating disk.

Secured, as shown at 54, to the rear wall of the cabinet are ends of arms 56, extending parallel with the said rear wall and at a short distance therefrom. To the free ends of said arms are secured clamps 57, which clamp to said arms a long, slightly flaring, straight, portion 58 of a horn 59, which extends upwardly from the lower end of said

straight portion 58 and flares greatly to its open end. Rigidly secured to said straight portion of the horn, immediately above the upper clamp 57 therefor, are secured two, upper and lower, plates 70, 71. To these plates are secured two vertical rods 72, one on each side of said straight portion of the horn, the plates 70, 71 being spaced sufficiently to furnish a rigid support for said vertical rods. Said rods 72 extend upward, and pass through a hole 73 in the table, and to their upper ends is secured by screws 74 a cross plate 76. Said cross plate is formed with a central brass casing 77, opening downwardly, in which casing is embedded a block 78 of fiber, and in said block is driven, or otherwise firmly secured, a downwardly pointed stud or pivot pin 79. Secured in the straight portion 58 of the horn at its upper end is a narrow cross bar 81, to the center of which is secured a bearing block 82 having a conical bearing 83.

84 indicates the bent swinging arm or tube for conveying the sound from the sound box. The lower end of said arm is provided with a cross bar 86 having a central socket 87 containing a fiber block 88, in which is a downwardly pointing pivot pin 89 fitting in the conical bearing 83. Upon the outer side of said swinging tube is formed a boss 91, in which is a conical bearing 92, in which is received the downwardly pointing pin 79. By this arrangement it will be observed that the swinging tube is secured directly to the horn, and is independent of the table or any other part of the cabinet. Moreover yielding non-metallic material is interposed between the sound-conveying tube and the horn at the pivots of the former. Consequently the sound vibrations received by said swinging arm are conveyed to the horn undampened and are produced by said horn with great clearness, purity and resonance.

In order to obtain the full effect of the sound reproduced, the cabinet is formed with openings 93 in its front and side walls, and the mouth of the horn is arranged in suitable position to direct the sound vibrations against an obliquely arranged sound board 94, which is attached, at its front upper edge, as shown at 96, to the front ends of the side cleats 3. At its sloping side edges, and also at its rear edge, it is unattached except at the rear lower corners, which corners are attached to the cabinet by suitable blocks 97, one only being here shown. The openings 93 will, for the purpose of excluding dust, be closed as is usual by silk or suitable screening material, not here shown.

The free end of the sound tube is T-shaped so as to form a transverse tubular bearing 98, in which rotates a tube 101, at one end closed and secured by a screw 102

to an end of an arm 103, carrying at the other end a cylindrical weight 104 extending parallel with the tube 101. The inner end of the arm 103 is formed with holes 106 for screwing steady pins 105 therein to secure said arm against rotation on said tube and so that it extends in a downward direction approximately parallel with the needle carrier lever 119 hereinafter described. Said weight thus forms a very convenient handle for turning up the sound box to change the needle, and it also forms a stop resting on the sound conveying tube when the sound box is so turned up. Within said tube 101 there is secured an oblique wall 107, whereon the sound entering the tube at its open end impinges and is then reflected along the main portion of the sound tube. Around the open end of the tube 101 is secured a plate 108 having a suitable number, three being here shown, of bayonet slots 109, adapted to receive headed pins 111 extending from an annular plate 112 secured to the reproducer casing 114 by screws 113 passing through a rubber gasket 115. The plate 108 is cut in three places, said cuts extending radially outward from the extreme portions of the narrow ends of said bayonet slots so as to form in the plate outside said bayonet slots, three tongues 110. These tongues are permanently bent outward, as shown in Fig. 9, but, the plate being of resilient material, when, the pins are inserted in the wide ends of said bayonet slots and the reproducer casing 114 is turned so that said pins enter the narrow portions, the tongues 110 bear against the inner surfaces of the heads of said pins and by their pressure thereon cause the annular plate 112 secured to the reproducer casing to fit tightly against said plate 108. Said reproducer casing is made of wood or metal, and in said casing is the diaphragm 117. I have found it desirable to make this diaphragm of wood, and considerably larger than the ordinary mica diaphragm. The circular edge of the diaphragm is clamped between soft rubber rings 118, said clamping being effected by the securement to each other of the sides of the casing. To one side of this diaphragm is secured in the center the long arm of a needle carrier lever 119, the short arm of which carries in the usual manner the needle 121. Said lever 119 is secured to a shaft 122 formed with conical ends, which ends are received in conical recesses in the ends of screws 123 screwed through hangers 124 secured to, or formed integral, with the sound-reproducing box. By screwing these screws in or out, the freedom of motion of the shaft in its conical bearings can be regulated. From the center of said shaft extends a spring arm 125, the free end of which is held between rubber washers 126, which are contained between metallic wash-

ers 127, which in turn are contained between adjusting nuts 128, which are screwed on a screw 129 extending from a cross bar 130 connecting the two hangers. In this way the tension of the spring plate, producing pressure of the long arm against the diaphragm, can be regulated as desired. 70

I have found that a wooden diaphragm, considerably larger than the mica diaphragm ordinarily used, gives excellent sound reproduction, especially with the arrangement of the sound box to vibrate on an axis in line with its center. By reason of the mode of attachment of the horn to the rear wall of the cabinet, said rear wall itself acts as a sounding board. In consequence, and because of the oblique sounding board and the free support of the horn, the vibrations are greatly amplified, so that a good tone is obtained even with a needle of medium size, which tone, of course, is less free from discordant sounds. 85

I claim:—

1. In combination with a cabinet having openings in its front and side walls, a sounding board in the cabinet extending obliquely rearwardly and downwardly, and the side edges extending adjacent to the openings in the side walls, the front edge being secured near the top of the opening in the front wall, a talking machine supported by said cabinet above said sounding board, and a horn extending from said talking machine near the rear wall of the cabinet and behind the rear edge of said sounding board downwardly to a level below the same and then upwardly, the mouth of the horn being directed toward the under side of said sounding board. 90

2. In combination with a talking machine, and a cabinet therefor, upper and lower horizontal arms each connected only at one end to a wall of said cabinet, and extending substantially parallel with, and at a short distance from, said wall, said arms being longer than their distance from said wall, and a horn supported wholly by the other ends of said arms. 105

3. In combination with a talking machine, a cabinet therefor, and a sounding board, the upper edge of said sounding board being connected to the front wall of said cabinet, and said sounding board sloping downwardly to the rear, the cabinet having an opening in its front wall beneath the upper edge of the sounding board, and an opening in a side wall extending above and below the sounding board, and a horn arranged obliquely to the sounding board for directing on to said sounding board the sound produced by the talking machine. 115 120

4. In a talking machine having a record carrier, a table therefor, a rotary shaft, a wheel carried thereby contacting with the under side of said record carrier, bearings for said shaft, arms upon the free ends of 125 130

which said bearings are carried, a shaft to which the other ends of said arms are secured, bearings for said latter shaft supported by the table, means for pressing upward the wheel shaft, a motor, and an operative connection between said motor and wheel shaft.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES F. A. STURTS.

Witnesses:

FRANCIS M. WRIGHT,
D. B. RICHARDS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

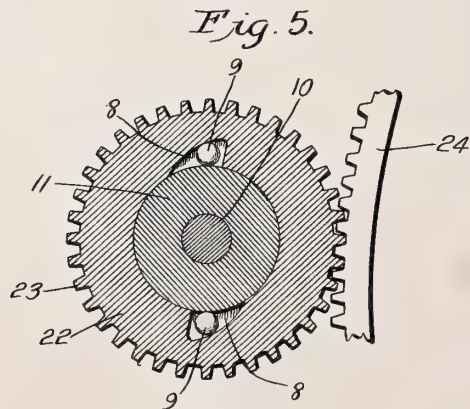
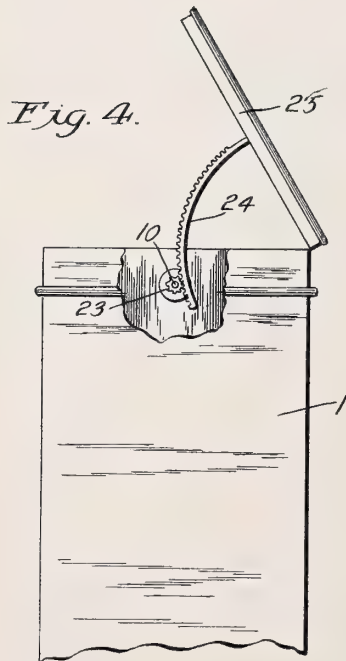
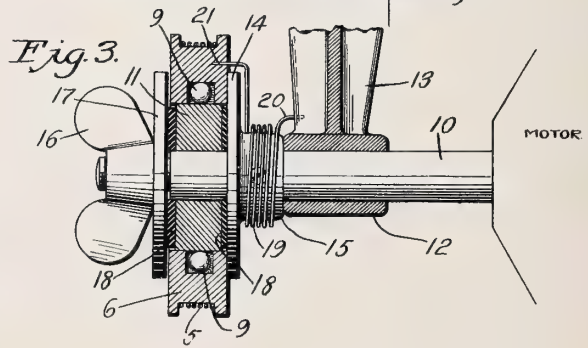
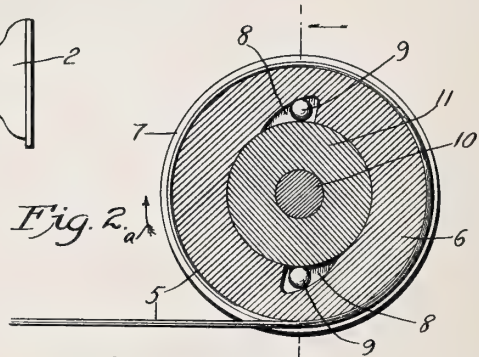
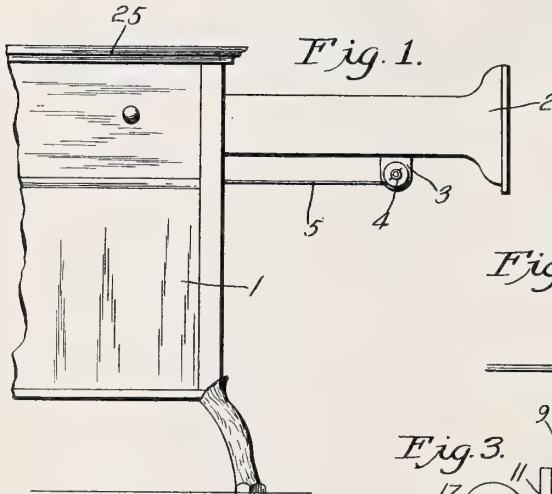
WINDING MECHANISM FOR TALKING MACHINE
MOTORS,

#1,196,966-----G. E. Molyneux,
Patented-Sept. 5th, 1916.
Filed-June 3rd, 1912.

G. E. MOLYNEUX.
WINDING MECHANISM FOR TALKING MACHINE MOTORS.
APPLICATION FILED JUNE 3, 1912.

1,196,966.

Patented Sept. 5, 1916.



WITNESSES

John C. Hoff
Geo. A. Simon

INVENTOR:

George E. Molyneux.
BY *Cha. M. C. Chapman.*
ATTORNEY.

UNITED STATES PATENT OFFICE.

GEORGE E. MOLYNEUX, OF BAYONNE, NEW JERSEY, ASSIGNOR OF ONE-THIRD TO
CHARLES McC. CHAPMAN, OF NEW YORK, N. Y.

WINDING MECHANISM FOR TALKING-MACHINE MOTORS.

1,196,966.

Specification of Letters Patent.

Patented Sept. 5, 1916.

Application filed June 3, 1912. Serial No. 701,143.

To all whom it may concern:

Be it known that I, GEORGE E. MOLYNEUX, a citizen of the United States, residing in Bayonne, county of Hudson, and State of New Jersey, have invented a new and useful Improvement in Winding Mechanism for Talking-Machine Motors, of which the following is a description.

This invention relates to talking-machines, and more particularly to mechanism for winding the motor of such machines.

Among the objects of my invention may be noted the following: to provide means by which the motor of the machine may be wound without the use of the usual crank, and to eliminate the said crank as a winding medium; to provide means by which the motor of a talking-machine may be wound through the medium of the cabinet or stand which supports or incloses the talking-machine; to provide a mechanism applicable to the well-known cabinet stands of the Columbia and Victor talking-machines by which the motor can be wound preparatory to an operation of the talking-machine when the drawer containing the disks, or the lid which closes the cabinet is opened; and to provide a simple, cheap, effective motor-winding means applicable to talking-machine stands, cabinets, or other supports of similar character.

In order that my invention may be clearly understood, I have provided drawings wherein:

Figure 1 is a side elevation of a portion of a cabinet containing a talking-machine, or the motor thereof, showing the manner in which my invention may be applied thereto; Fig. 2 is a sectional detail of the clutch mechanism by which the cable is operated for winding the motor; Fig. 3 is a sectional elevation showing the details of my winding mechanism; Fig. 4 is a side elevation, parts being broken away, of another form of cabinet showing my invention applied thereto; and Fig. 5 is an enlarged sectional elevation of the gear-clutch and driving-segment of the form shown in Fig. 4.

It should be premised that a great deal

of objection has been found to the usual and common mode of winding the motor of all types of talking-machines now in use and that the main fault found with the actuating motor is that it runs down very rapidly, will not drive effectively more than two disks and, when the motor is wound in the usual manner, the stand or table vibrates objectionably, and the operator is usually compelled to hold the instrument by one hand and wind the motor with the other. My invention is designed to overcome all these objections and, in Fig. 1, I have illustrated my invention applied to the form of cabinet provided with a drawer for holding the records and, in Fig. 4, I have shown my invention applied to the form of cabinet provided with a hinge-cover.

Referring to the drawings, the numeral 1 indicates the stand or cabinet, 2 the drawer thereof, 3 a lug or bracket, to a spool, disk or shaft 4 of which the cable 5 is securely fastened at its outer end. The cable 5 wraps around a clutch-drum 6, the circumference of which is channeled as at 7, to house the cable 5 and prevent contact therewith of any portion of the exterior of the cabinet. The clutch-drum 6 is provided at opposite points of its central bore with a cam-recess 8, in which is contained a ball 9, which, when the drum is rotated to drive the motor-shaft 10, binds against the circumference of the driving-disk 11, loose upon the motor-shaft 10. The shaft 10 extends from the motor, as usual and turns in the bearing 12, provided by a bracket or arm 13, secured in any usual manner to the exterior framework of the cabinet. The outer end of the shaft 10 has fixed thereto a disk 14, by means of a collar 15, through which a screw passes for engagement with the shaft. The disk 14 is sufficiently extensive to overlap a portion of the rear face of the clutch-drum 6; and it will be noted, upon reference to Fig. 3, that the driving-disk 11 is not quite as thick as is the clutch-drum 6. The outer end of the motor-shaft is screw-threaded and has applied thereto a winged nut 16, which engages a disk 17, similar to the disk

14, carried by the motor-shaft. The two disks embrace the clutch-drum 6 and each engages a washer 18, of any suitable frictional material, and presses said washer 5 against the disk 11, thus yieldingly holding the said disk relatively to the clutch-drum 6, and causing the latter, through its balls 9, to drive said disk and the motor-shaft on which the disk is mounted. A tension-spring 19 loosely encircles the collar 15, 10 and one end 20 of said spring is fixed to the bracket or arm 13, while the other end 21 is fixed to the clutch-drum 6; and the spring is so wound as to yieldingly oppose the 15 clutch action of the drum 6 and disk 11, and to separate the drum and disk after the motor-shaft has been wound. The winged nut 16 will be set so as to create sufficient friction upon the disk 11, through the medium of the washers and disks 14 and 17; 20 but will not be set so tightly as to bind the disk and shaft rigidly together, the object of this construction being to permit, under excessive stress of the cable, the clutch and 25 disk to rotate as a unit on the shaft in opposition to the winding action, thus avoiding accident or too much winding drive upon the motor-shaft.

The operation of this form of my invention will be readily understood upon reference to Figs. 1, 2 and 3, wherein it will be seen that, with the outer end of the cable fixed to the device 4 and its inner end wound about the clutch-drum and properly secured 35 thereto, an outward pull upon the drawer 12, to open the same, will result in stress upon the cable 5, which will cause the drum 6 to rotate in the direction of the arrow *a*, Fig. 2, with an initial tendency to loosely run upon the disk 11. The form of the cam-recesses 8, however, is such as to almost immediately 40 drive the balls 9 into the small end of the recesses, thus making a fast connection between the clutch-drum 6 and disk 11, which 45 will become effective through the disks 14 and 17, and their washers, to wind the motor-shaft 10, the same action winding up the spring 19 and storing power therein for the purpose of enabling it to perform its function when the winding action is complete. 50 With the drawer open, as shown in Fig. 1, the motor will be stored with power, a disk may be extracted from the drawer, applied to the machine and the latter set in operation, 55 the drawer thereafter being closed, thus releasing the clutch-drum and disk, which will be returned to normal position to wind up the slack of the cable 5, upon the drum 6, through the medium of the 60 spring 19.

In the form of my invention shown in Figs. 4 and 5, the clutch-drum 22 is provided with gear-teeth 23, which mesh with the segmental rack 24, connected in any suit-

able manner, at its outer end, to the lid 25, 65 of the cabinet 1. The motor-shaft, disk, balls and recesses are all indicated by the same reference characters in this form of my invention as in the form shown in Figs. 1, 2 and 3. In fact, the only manner in 70 which the form of my invention shown in Figs. 4 and 5 differs from the other form is in the rack and pinion for driving the motor-shaft 10.

Other forms of my invention could be 75 herein shown; but, further illustration of the broad idea of means is deemed to be unnecessary, since it will be readily understood that, inasmuch as I believe myself to be the first to provide a so-called self-winding 80 motor for talking-machines, all forms which are mechanical and functional equivalents will be comprehended by the broad claims appended to this description.

Having thus described my invention, what 85 I claim and desire to secure by Letters Patent is:

1. In combination, a cabinet for a talking machine, said cabinet having a movable part confined to right line reciprocations, a 90 motor mounted in said cabinet, a winding-mechanism for said motor carried entirely by the shaft thereof, and a connection between the movable part of the cabinet and the winding mechanism whereby, upon ac- 95 tuation of the movable part the motor will be wound by the action of the winding mechanism.

2. In combination, a cabinet for a talking machine having a movable part; a motor 100 mounted in said cabinet having its driving-shaft extended at one side; a winding-mechanism for said motor mounted entirely on its shaft-extension within the cabinet; and a flexible connection between the movable 105 part of the cabinet and said winding mechanism, whereby the motor may be wound upon operation of said movable part.

3. In combination, a support for a talking-machine having a movable part; a motor 110 on said support; a winding mechanism for the motor carried entirely by the driving-shaft of the latter, said winding-mechanism comprising a clutch-member fixed to said shaft and a complementary member running loosely upon said fixed member; means 115 connecting the winding mechanism with said movable part, whereby when the latter is actuated the motor will be wound; and means for restoring the winding mechanism 120 to normal condition after the motor is wound.

4. In combination, a support for a talking machine having a movable part; a motor on said support; a winding mechanism for 125 the motor carried entirely by the driving-shaft of the latter, said winding mechanism including a clutch-member; a flexible con-

nection between said movable-part and said clutch-mechanism; and means for winding the flexible connection upon the clutch-mechanism, whereby when the movable part is actuated the motor may be wound and thereafter the connection wound upon the clutch-mechanism.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

GEORGE E. MOLYNEUX.

Witnesses:

CHAS. MCC. CHAPMAN,
M. HERSKOVITZ.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

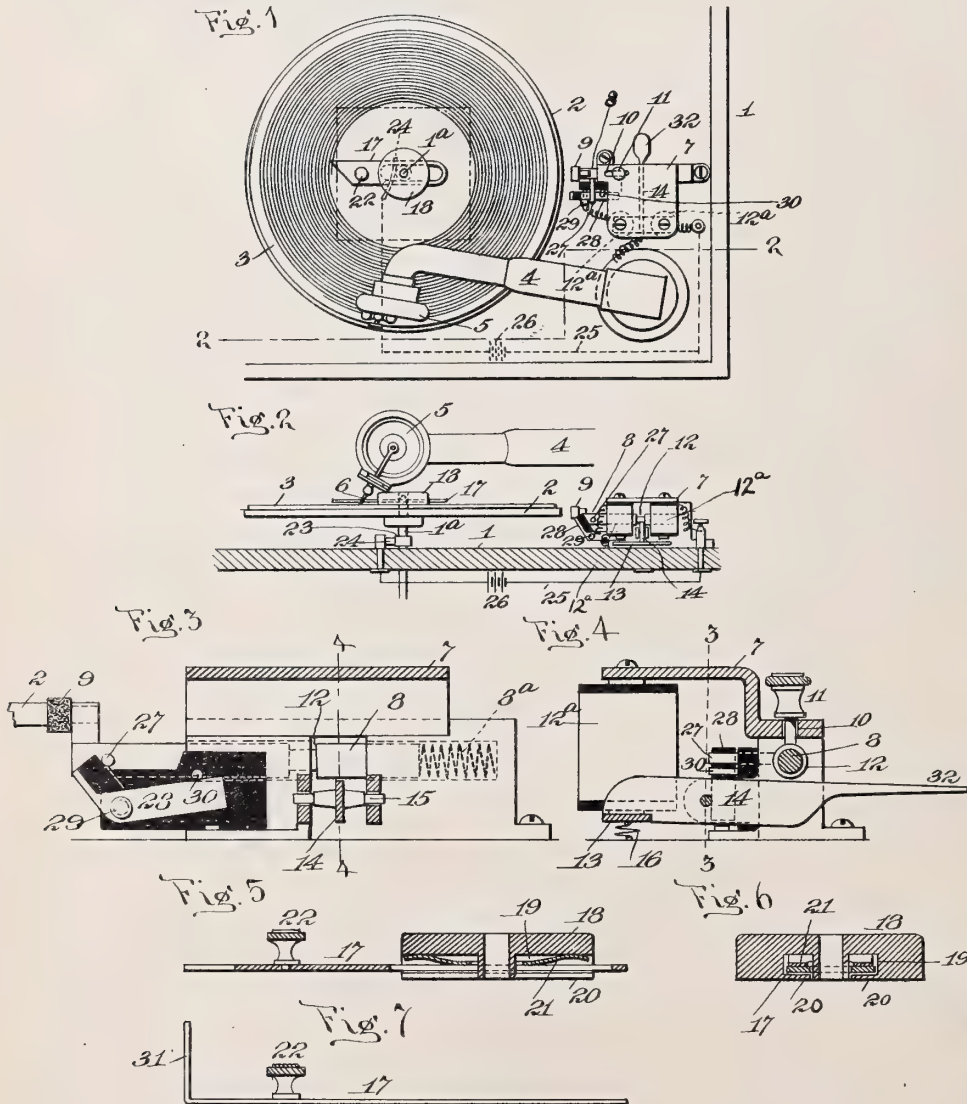
BRAKE FOR TALKING
MACHINES,

#1,197,124-----W.H.Hoschke,
Patented-Sept. 5, 1916.
Filed-Jan. 3rd, 1914.

W. H. HOSCHKE.
BRAKE FOR TALKING MACHINES.
APPLICATION FILED JAN. 3, 1914.

1,197,124.

Patented Sept. 5, 1916.



Witnesses:

John L. Lotech
W. Jones

Inventor

William H. Hoschke
by Waldo L. Morse Attorneys.

UNITED STATES PATENT OFFICE.

WILLIAM H. HOSCHKE, OF NEW YORK, N. Y., ASSIGNOR TO CRESCENT TALKING MACHINE COMPANY, INC., A CORPORATION OF NEW YORK.

BRAKE FOR TALKING-MACHINES.

1,197,124.

Specification of Letters Patent.

Patented Sept. 5, 1916.

Application filed January 3, 1914. Serial No. 810,142.

To all whom it may concern:

Be it known that I, WILLIAM H. HOSCHKE, a citizen of the United States, residing in the borough of Brooklyn, county of Kings, city and State of New York, have invented a certain new and useful Improvement in Brakes for Talking-Machines, of which the following is a specification.

My object is to produce a brake for disk phonographs or similar instruments which will be automatic in its action; that is, a brake which will be put on and stop the rotation of the record disk when the record has been run off. This I accomplish by means of an electrical device which, when the needle reaches the end of the record groove, will complete a circuit, apply a brake and stop the motor.

Another object is to produce a device which will automatically break the circuit when the brake is applied.

A further object is to provide means whereby the device may be used on records of different lengths.

These and further objects will be more fully pointed out in the following specification and accompanying drawings considered together or separately.

My invention is illustrated in the accompanying drawings in which the same parts are designated by similar reference characters in all of the figures.

In the drawings, Figure 1 is a plan view of a portion of a talking machine equipped with my improved brake. Fig. 2 is a section on the line 2—2 of Fig. 1. Fig. 3 is a section on the line 3—3 of Fig. 4. Fig. 4 is a section on the line 4—4 of Fig. 3. Fig. 5 is a longitudinal section of the record contact arm. Fig. 6 is a cross section of the same. Fig. 7 is a detail view of a modification.

1 represents the casing of a disk record talking machine provided with the usual motor, the shaft 1^a of which projects through the top of the casing and carries a turntable 2 on which rests a disk record 3. Supported on the casing and movable relatively thereto is a tone arm 4 of any preferred type which is provided with a speaker or reproducer 5, the needle 6 of which engages and travels along the record groove in the disk as the latter is rotated by the motor.

Mounted upon the casing 1 at any convenient point in proximity to the periphery

of the turntable 2 is a frame 7 which supports the operating parts of the brake. Within a socket in the frame 7 is mounted a plunger 8 which is pressed toward the turntable by means of a spring 8^a engaging one end of the plunger and abutting against the end of the socket. The opposite end of the plunger carries a brake shoe 9 preferably of felt, leather or the like.

Within the frame and communicating with the socket is a slot 10. A knob 11 carried by the plunger projects through this slot and is limited in its movements by the slot. The plunger is provided with a circumferential groove 12 for a purpose to be hereinafter described.

Carried on an extension of the frame 7 is a pair of electro-magnets 12^a, 12^a. Coöperating with the magnets is an armature 13 which is mounted on an arm 14 pivoted at 15 and projecting through a recess in the frame 7 and passing under the plunger 8. The armature 13 may be retracted from the poles of the magnets by gravity but I prefer to make use of a light spring 16 for that purpose.

Resting on the record disk and moving therewith is placed a contact arm for completing the circuit through the magnets to set the brake. This contact comprises a flat plate 17 having one end beveled and the other end slotted. The plate is slidably mounted in a weighted turret 18 which is provided with a recess 19 for that purpose. The recess is provided with inturned flanges 20 to retain the plate 17 in place when the turret is removed from the disk. A spring 21 between the roof of the recess and the flanges serves to retain the plate 17 in the desired position. The slot in the plate plays over a collar depending from the roof of the turret and the plate is provided with a knob 22 by means of which it may be adjusted in the turret. The turret is perforated through its center and the opening is designed to make a relatively close fit with that portion of the motor shaft which projects above the record disk. The plate 17 is held in place by the weight of the turret and its engagement with the shaft. Below the turntable the motor shaft is provided with a ring 23 and engaging this ring is a brush 24 in the circuit 25 which includes a battery 26, magnets 12^a, 12^a, circuit-breaker

28, frame 7, tone arm 4, needle 6, plate 17, turret 18, shaft 1^a and ring 23.

The operation of so much of my improved device as has been described above is as follows: The turret is placed over the end of the motor shaft and on top of the record with the beveled end of the plate 17 resting adjacent to the inner end of the record groove. The plunger 8 is moved back against its spring and the armature arm will, by means of the spring 16, be held in engagement with the groove 12 in the plunger and the brake shoe will be held away from the turn table. The motor on being started will rotate the turntable and the engagement of the needle with the record groove will feed it toward the center of the disk and the inner end of the record groove. When the metallic needle reaches the end of the record groove it will come in contact with the plate 17 and close the circuit through the magnet. The armature will be attracted, the armature arm will be withdrawn from the groove 12 and the spring will move the plunger and apply the brake. When the plunger has nearly reached its extreme movement to apply the brake, a finger 27 carried on the plunger will strike against an inclined arm on a circuit breaker 28 pivoted at 29 to an insulating block on the frame, and move the circuit breaker from its contact with the frame thereby breaking the circuit after the brake has been applied and prevent the running down of the battery. The insulating block carries a stop 30 to prevent excessive movement of the contact breaker. When the brake shoe is released from contact with the turntable the finger 27 will be moved to the right and the

long end of the contact breaker will fall and make contact with the frame.

The end of the armature arm is provided with a finger piece 32 by means of which the brake may be manually operated.

When it is desired to use a reproducing needle of wood, glass or any other non-conducting material, the plate 17 may be provided with a finger 31 which will contact with a metallic part of the speaker.

In accordance with the provisions of the patent statutes, I have described the principle of my invention together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is merely illustrative and that the invention can be carried out in other ways.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is, as follows:

A brake comprising a frame, a spring actuated plunger carried in the frame, a magnet, means controlled by the magnet for holding the plunger against the spring pressure, a circuit for the magnet, a circuit breaker on the frame, and means on the plunger for moving the circuit breaker to break the circuit after the magnet has been energized and the plunger has been released, and a stop carried by the frame to limit the movement of the circuit breaker.

This specification signed and witnessed this 27th day of December, 1913.

WILLIAM H. HOSCHKE.

Witnesses:

GEORGE W. BEHRENS,
THEODORE LEMM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

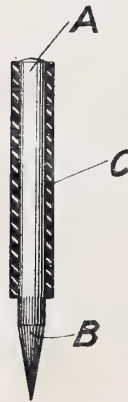
STYLUS FOR TALKING MACHINES AND
PROCESS OF MAKING SAME,

#1,197,165-----L.J. Whiteman, Jr.,
Patented-Sept. 5th, 1916.
Filed-Nov. 27th, 1914.

L. J. WHITEMAN, JR.
STYLUS FOR TALKING MACHINES AND PROCESS OF MAKING SAME.
APPLICATION FILED NOV. 27, 1914.

1,197,165.

Patented Sept. 5, 1916.



Inventor
L. J. Whiteman, Jr.
By his Attorney
A. Parker Smith

UNITED STATES PATENT OFFICE.

LEANDER J. WHITEMAN, JR., OF NEWARK, NEW JERSEY.

STYLUS FOR TALKING-MACHINES AND PROCESS OF MAKING SAME.

1,197,165.

Specification of Letters Patent.

Patented Sept. 5, 1916.

Application filed November 27, 1914. Serial No. 874,331.

To all whom it may concern:

Be it known that I, LEANDER J. WHITEMAN, Jr., a citizen of the United States of America, residing at Newark, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Styli for Talking-Machines and Processes of Making Same, of which the following is a specification.

My invention relates to talking machines and comprises a novel stylus or reproducer point for use in such apparatus, and a novel process of making the same.

The ordinary stylus made of metal or other hard substance is apt to cut or wear out the record groove in a sound record tablet too rapidly and also to produce scratching sounds which are objectionable as interfering with the accuracy of the sound reproduction. On the other hand, reproducer needles or stylus points made of wood, to reduce the scratching sounds and the friction on the sound records, are apt to wear too rapidly and lose their points before the reproduction of a long sound record is completed. Also they are not stiff enough to transmit the full volume of sound vibrations to the diaphragm of the sound box and by reason of the fragile character of the material used the point engaging the record groove is sometimes broken away entirely when a high, loud note is being reproduced.

I have discovered that a needle or stylus made of bone and properly treated will be free from all these disadvantages, give a true reproduction of full volume of tone devoid of scratching sounds, will not cut or wear the record tablet surface appreciably, and will retain its point long enough to reproduce several sound records in succession without resharpening. It can also be resharpened or reground to fit it for further use, after having its point deformed by the friction of contact with the sound record groove.

The best method of carrying out my invention at present known to me is as follows: I take compressed bone, or horn, which is an article of commerce occurring in the form of sheets or strips and which is formed from the bones or horns of cattle, and I cut or saw the same into rods of the requisite cross section. These are cut into proper lengths for use in the standard talk-

ing machine and given a tapering point at one end in any convenient manner. This material in its raw state is somewhat porous or cellular in structure, not of sufficient hardness for the purpose and containing various earthy salts such as those of calcium, sodium, magnesium, etc. As a result, a needle made of this material without further treatment would wear too rapidly and also scratch when rubbed along the sound record groove. To remove these disadvantageous qualities I first harden the bone, preferably by immersing it for about an hour in a hardening bath, such as a saturated solution of chromic acid, which coagulates the gelatin forming an important constituent of the bone. The hardening process may be performed by the alternative method of drying the bone slowly. Preferably I use for this purpose radiant heat such as is given off by an electric heating block. The chromic acid treatment, however, gives the better results. The effect of this portion of the treatment, performed in either manner, is to stiffen the needle as a whole, and enhance its elasticity and capacity for transmitting sound vibrations.

The second step of my process has for its object the removal of the earthy salts from that portion of the needle which is to come in contact with the sound record tablet. This I accomplish by immersing or washing the point of the needle in a dilute acid, such as a weak solution of hydrochloric acid. I find it sufficient to thus treat the pointed end of the needle for a distance of about a quarter of an inch from its extremity, and accomplish this by keeping it immersed to that extent in the acid bath for about an hour. This softens the immersed portion of the needle and dissolves out the earthy salts and other filling of that character from the pores or cells of the bone, but without destroying the shape of the needle point. The structure of the needle point and surfaces adjacent thereto is left in a soft, spongy, porous or cellular condition having a great capacity for absorption of fluids. I next immerse the point of the needle, which has been treated as above described, in a liquid grease or oil. So far I have obtained the best results from treatment with sperm oil. After an immersion of thirty minutes or less, the porous structure above described,

will have filled or loaded its pores or cells completely with the oil. As a result the point of the needle is transformed into a smooth, tough solid substance, which has a self lubricating surface or exterior shell free from grit, but capable of resisting wear resulting from rubbing over the sound record tablet sufficiently to enable several long sound records to be reproduced in succession without replacing or resharpening the needle. After the point is worn down, the needle can be resharpened a number of times before the oil saturated point or shell is entirely removed. I have also found it advantageous to give the shank or body of the needle a thin coating of rubber. This can be done by dipping it in a liquid rubber solution, after the other treatment above described has been completed. This enables the clamp of the stylus or needle holder to grasp the needle firmly and prevents chattering in the clamp.

The result of the above described process is a reproducer needle or stylus point which has a hard elastic core for transmitting sound vibrations, a tough, smooth, oily point for gliding over the sound record groove without scratching or wearing the surface of the tablet, and a slightly yielding, friction-producing clamping surface on its shank which enables the holding clamp to grasp it firmly without the exertion of crushing pressure, and without the possibility of chattering or rattling at the points of contact.

Certain steps of the treatment above described could be omitted without entirely preventing the attainment of the results desired, and other materials might be substituted for some of those mentioned in certain of the operations set out, so long as the substituted materials operate in substantially the same manner to effect substantially the same result.

In the drawing which shows a side elevation of a needle made in accordance with my invention, A, represents the body of the needle, B, the pointed end saturated with lubricating fluid and C, the rubber coating on the shank (shown in section) which may be used if desired, but is not absolutely necessary.

Having, therefore, described my invention, I claim:

1. The process of making a sound reproducing stylus which comprises the following steps, first, subjecting properly shaped pieces of compressed bone to a hardening treatment; second, treating the pointed end of the stylus so formed to an acid bath which dissolves out the earthy salts contained in the compressed bone, and third, saturating the porous structure left after the second step with a lubricating fluid.

2. The process of making a sound reproducing stylus which comprises the following steps, first, treating properly shaped pieces of compressed bone with a chromic acid solution; second, immersing the pointed end of the stylus so produced in a weak solution of hydrochloric acid, and, third, saturating the porous structure, left after the second step, with sperm oil.

3. A process of making needles for the sound reproducers of talking machines which comprises the shaping of such needles out of a tough cellular or porous substance, the dissolving out of the contents of such pores or cells, and the reloading of the pores or cells with a heavy lubricating substance.

4. The product of the process herein described, being a reproducer needle for talking machines having a body of bone, and a point free from earthy materials with the pores or cells at and about said point loaded with a lubricating fluid.

5. The product of the process herein described, being a reproducer needle for talking machines having a body of compressed bone, and a point free from earthy materials with the pores and cells at and about said point loaded with sperm oil.

6. The product of the process herein described, being a reproducer needle for talking machines having a body of bone, and a point free from earthy materials with the pores or cells at and about said point loaded with a lubricating fluid, the shank of the needle being coated with rubber.

LEANDER J. WHITEMAN, JR.

Witnesses:

C. E. BOUQUEO,

WALTER J. BURCHETT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SWITCH,
#1,197,497-----E.R.Johnson & H.H.Murray,
Patented-Sept.5th, 1916.
Filed-Nov. 4th, 1912.

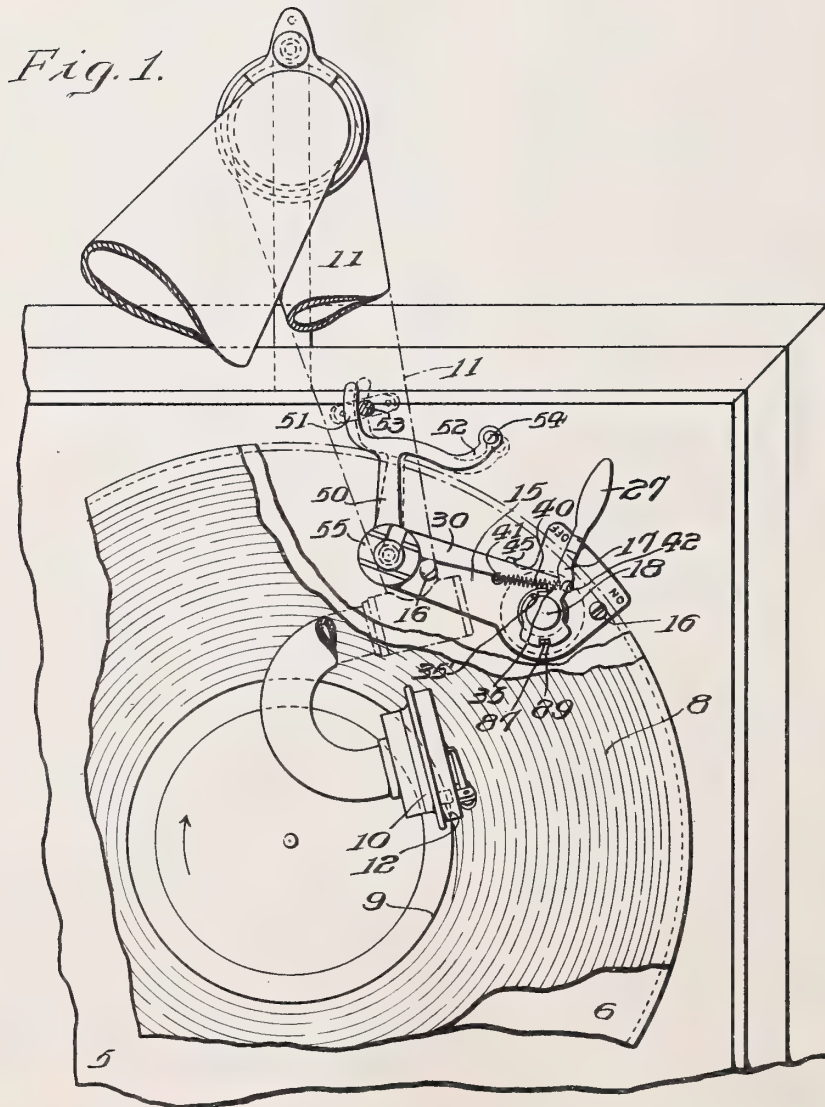
E. R. JOHNSON & H. H. MURRAY.
SWITCH.

APPLICATION FILED NOV. 4, 1912.

1,197,497.

Patented Sept. 5, 1916.

3 SHEETS—SHEET 1.



WITNESSES
W. G. Hartman.
A. J. Gardner.

BY

INVENTORS
Eldridge R. Johnson.
Henry H. Murray.
John V. Bell.
ATTORNEY



APPLICATION FILED NOV. 4, 1912.

Patented Sept. 5, 1916.

3 SHEETS—SHEET 2.



BY

INVENTORS
Eldridge R. Johnson
Henry H. Murray.
Irene Tetley.
ATTORNEY



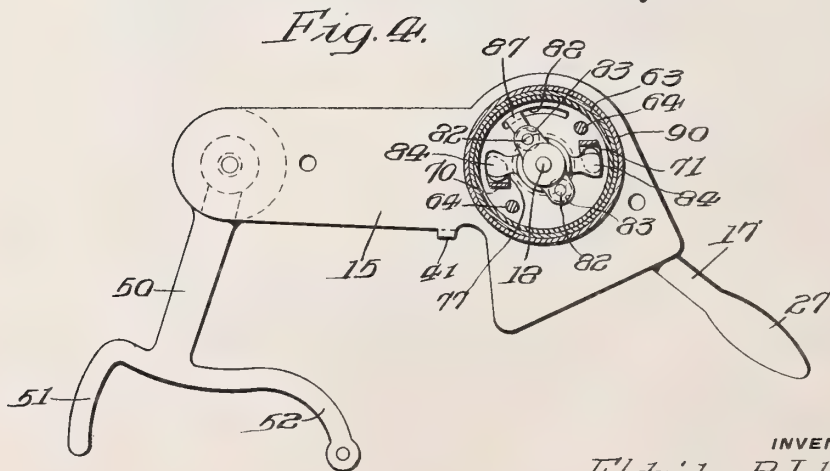
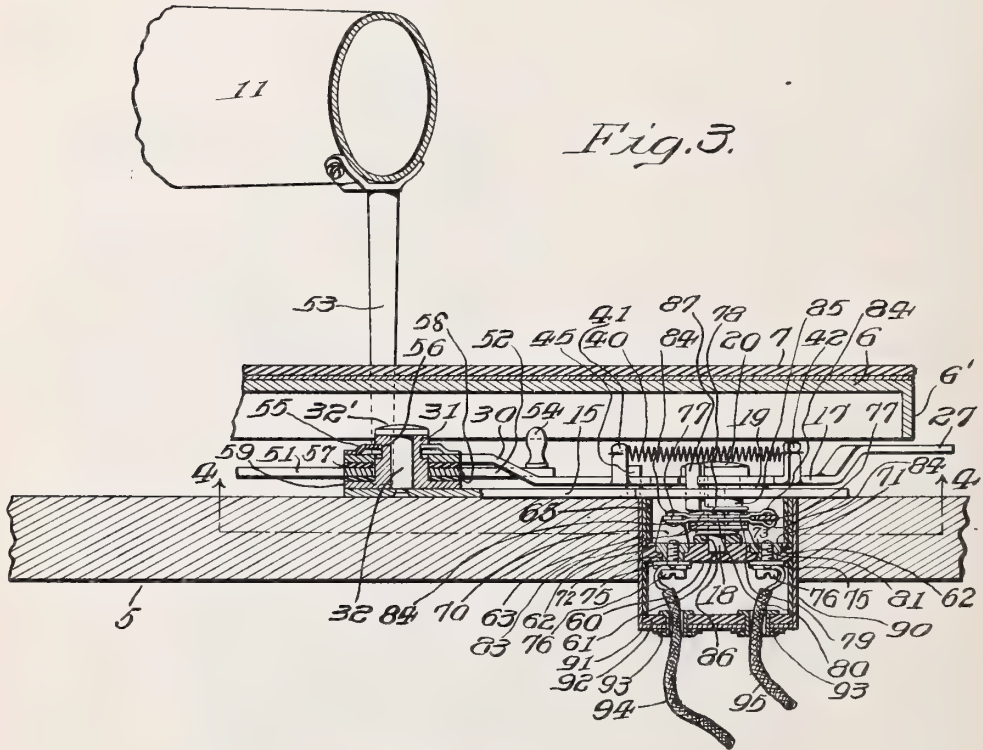
E. R. JOHNSON & H. H. MURRAY.
SWITCH.

APPLICATION FILED NOV. 4, 1912.

1,197,497.

Patented Sept. 5, 1916.

3 SHEETS—SHEET 3.



WITNESSES
F. J. Hartman
A. J. Gardner

BY

INVENTORS
Eldridge R. Johnson
Henry H. Murray
Wm. H. Murray
ATTORNEY

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF MERION, PENNSYLVANIA, AND HENRY H. MURRAY, OF RIVERTON, NEW JERSEY, ASSIGNORS TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SWITCH.

1,197,497.

Specification of Letters Patent.

Patented Sept. 5, 1916.

Application filed November 4, 1912. Serial No. 729,243.

To all whom it may concern:

Be it known that we, ELDRIDGE R. JOHNSON and HENRY H. MURRAY, both citizens of the United States, and residents of Merion, county of Montgomery, and State of Pennsylvania, and Riverton, county of Burlington, and State of New Jersey, respectively, have invented certain new and useful Improvements in Switches, of which the following is a specification.

The main objects of this invention are to provide, in a talking machine actuated by an electric motor, an improved automatic switch mechanism for controlling the operation of the motor; to provide an improved automatic electric switch; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a fragmentary top plan view of a talking machine provided with an automatic switch constructed in accordance with this invention, the switch being shown as it appears just after it has been automatically opened; Fig. 2 is a similar view showing the switch closed and the talking machine in operation; Fig. 3 is a fragmentary vertical section on the line 3—3 of Fig. 2, and Fig. 4 is a horizontal section on the line 4—4 of Fig. 3, looking in the direction of the arrows and showing only a part of the device.

Referring to the drawings, one embodiment of this invention comprises a talking machine including the usual or any suitable cabinet 5, spaced above which is a horizontal rotary disk record support 6, which is mounted to be rotated about a fixed vertical axis by an electric motor (not shown) preferably arranged within the cabinet 5. The turntable 6 is provided with a marginal cylindrical rim 6', projecting downwardly therefrom and preferably integral therewith, which acts as a shield to protect the automatic switch mechanism as will appear hereinafter.

Upon the record support 6 is a sound record 7, provided as usual with a spiral groove 8 of uniform depth and in the form of lateral undulations corresponding to sound waves. This record may be such as is ordinarily used on talking machines of the class illustrated, but for the purposes of this invention, an improved record is preferred

which is provided not only with the laterally undulating spiral groove 8 of uniform depth, but also with a concentric circular groove 9 which is a continuation of the inner end of the spiral undulatory groove 8. This concentric circular groove 9 is preferably made slightly more noticeable than the spiral groove, by being made deeper or wider, or both deeper and wider than the spiral groove.

Above the record 7 is the usual or any suitable sound box 10 which is connected to the smaller end of a tapering tone arm 11 to swing with respect to the tone arm toward and away from the record, and to swing with the tone arm across the record, the tone arm being pivoted at its larger end to swing in a fixed plane about a vertical axis. The sound box 10 is provided with the usual or any suitable stylus 12, arranged to engage in the spiral undulatory groove 8 for reproducing sound and for feeding or propelling the sound box across the record.

For starting or stopping the rotation of the record support 6, there is provided an automatic switch mechanism which is preferably arranged upon the top of the cabinet 1, and mainly beneath the record support. This switch comprises a base plate 15, which is secured by screws 16, or otherwise, to the top of the cabinet beneath the record support. Superimposed upon the base plate 15 is a switch lever 17, which is mounted to oscillate about a vertical fixed pivot 18, extending tightly through an aperture provided therefor in the base plate, a washer 19 being preferably interposed around the pivot 18, between and in contact with the switch lever and the base plate, and the pivot being provided above the switch lever with the head 20 having a flat under surface which engages against the upper surface of the switch lever to hold the switch lever rotatably in position. The switch lever 17 extends from the pivot 18 outwardly beneath the flange 6' of the record support, and terminates in an upwardly offset portion extending outwardly from the record support and forming a handle 27.

For holding the switch lever 17 in a closed or operative position, a latch 30 is mounted at one end upon a sleeve 31, which is rotatably mounted on a vertical pivot 32 the lower end of which is rigidly secured to

the base plate 15, and the upper end of which is provided with a head 32' engaging against the upper end of the sleeve 31, to prevent upward movement of the sleeve.

5 The free end of the latch 30 is provided with a forwardly tapering tooth 35, arranged to engage in a corresponding notch 35', provided therefor in the switch lever 17 adjacent its pivot 18, and the arrangement
10 is such that when the tooth 35 is in the notch 35', the switch lever 17 is held in a closed or operative position, as will appear hereinafter.

For performing the double function of
15 holding the tooth 35 of the latch 30 in engagement with the notch 35' of the switch lever 17, and of swinging the switch lever 17 anti-clockwise into an open or inoperative position when the latch 30 is released from
20 engagement with the switch lever 17, a spiral spring 40 or other resilient or yielding means, is secured at one end to a lug 41 projecting upwardly from, and preferably integral with the latch 30, and at its other
25 end to a lug 42, projecting upwardly from and preferably integral with the switch lever 17. These lugs 41 and 42 are so positioned that when the tooth 35 is in engagement with its notch 35', as shown in Fig. 2,
30 the line of action of the spiral spring 40 is spaced slightly in front of the tooth 35, and is nearly radial with respect to the axis of oscillation of the latch 15, the line of action of the spring preferably being spaced
35 slightly away from this axis of oscillation and spaced between this axis and the tooth 35. In this position the spring acts to hold the tooth 35 in engagement in its notch 35', but with only a relatively slight force.
40 When the tooth 35 is thrown out of engagement with the notch 35', by swinging the latch 30 for a short distance anti-clockwise, the spring will act effectively to rotate the switch lever 17 anti-clockwise into an inoperative position resting against the free
45 end of the latch 30, as shown in Fig. 1. In the latter position the spring 40 acts to hold the rear edge of the free end of the latch 30 lightly in engagement with a stop 45 provided therefor, and projecting upwardly
50 from, and preferably integral with, the base plate 15, and maintains the tooth 35 in such a position that only a slight oscillation is necessary to bring it into operative engagement in the notch 35'. When the tooth 35
55 is in engagement with its notch 35', it may be released or thrown out of engagement at any time by a slight pressure anti-clockwise, exerted manually or otherwise upon the
60 switch lever 17, the outer side edge of the tooth and the corresponding wall of the notch 35' being inclined in a suitable direction to produce this effect; and when the tooth 35 is out of engagement with its notch,
65 and in its normal inoperative position as

shown in Fig. 1, it may be brought into engagement in the notch simply by rotating the switch lever 17 clockwise. The inner side edge of the tooth 35 and the corresponding wall of the notch 35' are preferably so
70 shaped as to maintain the tooth in engagement in the notch against any pressure that may be applied clockwise to the switch lever 17.

For automatically releasing the latch 30
75 from engagement with the switch lever 17, an arm 50 is mounted at one end upon the sleeve 31 and projects from the sleeve rearwardly, and terminates in the rear of the margin of the turntable 6 in a bifurcated
80 end forming two fingers, 51 and 52. The inner end of one, 51, of these fingers, is arranged to be engaged and actuated by the lower end of a vertical stud 53, which is rigidly secured at its upper end to the under
85 side of the tone arm 11. The other finger, 52, of the arm 50 is preferably provided at its outer end with an upwardly extending stud 54 in the form of a handle, for the convenient manual operation or adjustment of
90 the arm 50.

To transmit motion from the arm 50 to the latch 30, and at the same time to permit of the adjustment of the arm 50 rotatably with respect to the latch 30, to bring the
95 finger 51, into position to be engaged by the stud 53 at any desired position, the arm 50 and the latch 30 are preferably yieldingly clamped in predetermined relationship by means of a yielding split washer or U-
100 shaped spring clip 55, made of spring steel, or other suitable material. The spring clip 55, when in operative position, partially surrounds the sleeve 31 coaxial therewith, and engages against and is held in position by
105 the walls of an annular groove 56, provided therefor in the sleeve 31. This clip 55 is normally in contact with and presses downwardly against the upper surface of the corresponding end of the latch 30, which is
110 preferably arranged above the corresponding end of the arm 50. A washer 57 of fiber, or other suitable material is preferably interposed around the sleeve 31 between the adjacent ends of the latch 30 and the arm
115 50, and a corresponding washer 58 is interposed around the sleeve 31 and between the under surface of the corresponding end of the arm 50 and an annular flange 59 which projects outwardly from the lower end of
120 the sleeve 31, preferably integral therewith. The arm 50, the latch 30, and the washers 57 and 58 are preferably rotatable with respect to the sleeve 31, but are normally clamped in predetermined positions with
125 respect to the sleeve by the spring clip 55 with a force sufficient to hold these parts in fixed relationship under the action of the tone arm when being carried across a record by means of the stylus engaging in the
130

record groove. The arm 50 may, however, be rotated manually with respect to the sleeve 31, and the latch 30, by exerting a force on the handle 54, slightly in excess of the force exerted by the tone arm in co-

operating with the brake.
Arranged beneath and depending from the base plate 15 coaxial with the pivot 18, is an electric switch, comprising a flat circular horizontal base 60, of fiber or other insulating material, the upper surface of which is provided centrally with a cylindrical recess 61, in which snugly fits the lower end of the pivot 18. This base is provided on its upper side with a marginal annular recess 62, in which tightly fits the lower edge of a vertical cylindrical casing 63, the upper edge of which engages against the under surface of the base plate 15, the base 60 and the casing 63 forming an inclosure for containing the movable parts of the switch, the inclosure being clamped against the under surface of the base plate 15 by means of screws 64 extending upwardly through the base 60 and threaded into the base plate 15. A cylindrical lining 65 of fiber or other suitable non-conducting material is arranged in the casing 63 in contact with its inner surface and extending from the upper surface of the base 60 to the under surface of the base plate 15.

Projecting through the base 60 are two metal binding posts 70 and 71 which have transversely rectangular portions which fit snugly in rectangular recesses 72 and 73, respectively, provided therefor in the upper side of the base 60. The lower end of each of these posts 70 and 71 is reduced and cylindrical in transverse section, and is riveted over the under side of a washer 75 which is mounted upon the cylindrical end and in contact with the under side of the base 60 to hold the post in fixed position vertically. A binding screw 76 is threaded into the lower end of each post 70 and 71 for the usual purpose of clamping one end of a wire or flexible conductor in place. The upper ends of the two binding posts 70 and 71 are flattened and bent horizontally to form two diametrically opposed stationary contacts 77.

Surrounding the pivot 18 coaxial therewith, is a rotatable switch member, comprising four superimposed plates 78, 79, 80 and 81, which are clamped together by means of vertical rivets 82, the top plate 78 and the bottom plate 81 being spaced and insulated from the intermediate plates, 79 and 80, by means of washers 83, of insulating material, surrounding the rivets 82, the intermediate plates 79 and 80 being provided with suitable apertures to keep these intermediate plates out of contact with, and insulated from, the rivets 82 and the pivot 18. These intermediate plates are made of spring brass or other resilient conducting means, and are

provided with diametrically opposed extensions 84, forming bifurcated movable contacts arranged to embrace and cooperate in the usual manner with the stationary contacts 77 of the switch. The bifurcated contacts 84 are held against movement longitudinally of the pivot 18 by means of suitable washers 85 and 86 surrounding the pivot 18 between the top plate 78 and the under surface of the base plate 15 and between the bottom plate 81 and the upper surface of the base 60, respectively. For rotating the bifurcated contacts 84 of the switch, the top plate 78 is provided with a vertical extension 87 which projects loosely through a segmental slot 88 in the base plate 15 and concentric with the pivot 18, and engages snugly in a recess 89 provided therefor in an extension of the switch lever 17.

To provide a suitable protection for the binding screws 76, there is provided an outer cylindrical switch casing 90 of metal, which telescopes snugly around the cylindrical inner casing 63 and which extends snugly through a cylindrical aperture provided therefor in the cabinet. The lower end of this outer casing is closed as at 91, and spaced beneath the insulating base 60. The inner surface of the outer casing 90 may be provided beneath the insulating base 60 with a suitable lining 92 of fiber or other insulating material, and the lower end 91 of the outer casing is provided with two insulating bushings 93, to form insulated openings.

A flexible electric conductor 94, extends from one binding post 70 through one of the bushings 93 to the motor for actuating the record support 6, and a flexible electric conductor 95, extends from the other binding post 71 through the other bushing 93 to a source of electric current. A return wire (not shown), from the motor to the source of electric current, completes the motor circuit.

It is thought that in view of the foregoing description, a detailed statement of the operation of this invention is not necessary, but as a brief summary, it may be said that in the operation of a talking machine constructed in accordance with this invention, after the sound record has been placed upon the record support and while the switch is in its open or inoperative position, as shown in Fig. 1, the sound box is moved manually to bring the stylus into engagement with the circular groove 9, at the inner end of the undulatory spiral groove and the arm 50 is rotated, if necessary, to bring it into engagement with the stud 53, the stud being arranged between the two fingers 51 and 52. The sound box is then lifted and the talking machine is then started in the usual way by rotating the handle 27 of the switch lever clockwise until the tooth 35 is drawn into

engagement with its notch 35', thus closing the switch and holding the switch in closed position to actuate the motor for rotating the turntable. After the turntable has

5 reached its normal speed, the stylus is lowered into position at the beginning of the spiral undulatory groove adjacent the margin of the record, and the sound box is then carried automatically across the record, reproducing the sounds recorded thereon, until the stylus has nearly reached the inner end of the spiral undulatory groove and has brought the stud 53 carried by the tone arm into engagement against the finger 51. The stylus continuing its movement across the record from this point, now rotates the finger 51 anti-clockwise, carrying with it the arm 50 and the latch 30, thus disengaging the tooth 35 from its notch 35' and releasing the switch lever 17, the actual release of the switch lever 17 occurring just as the stylus is about to leave the spiral groove and enter the circular groove 9. The switch lever 17 is thus automatically caused to open the switch, and the current being thus cut off from the motor, the turntable quickly, but not too abruptly, comes to a state of rest. The switch lever 17 may also be operated manually at any time, as hereinbefore noted, to open or close the switch.

Although only a single form has been illustrated in which this invention may be embodied, the invention is not limited to the specific construction shown, but may be embodied in various forms without departing from the spirit of the invention or the scope of the appended claims.

Having thus described our invention, we claim:

40 1. In an automatic switch mechanism, the combination with a rotary element, of an element movable with respect to said rotary element, an electric switch, a movable retaining member for holding said switch in operative position, yielding means connecting said switch to said retaining member, means actuated by the movement of said second mentioned element for automatically releasing said retaining member from said switch.

2. In an automatic switch mechanism, the combination with a rotary element, of an element movable with respect to said rotary element, a movable switch member movable about a fixed axis, a retaining member mounted to oscillate about a fixed axis spaced from said first-mentioned axis and arranged to engage said switch member, yielding means connecting said switch member and said retaining member, means adjustable with respect to said retaining member and with which said second mentioned element engages to release said retaining member from said switch member.

65 3. In an automatic switch mechanism, the

combination with an electric switch member mounted to oscillate about a fixed axis, of a retaining member mounted to oscillate about a fixed axis and arranged to hold said switch member in an operative position, yielding means connecting said switch member and said retaining member and operative to move said switch member into an inoperative position upon being released by said retaining member, a releasing member arranged to move coaxially with said retaining member and either in unison therewith or independently thereof, and a movable element arranged to engage said releasing member to move said retaining member to release said switch member and to permit the same to be moved into inoperative position.

4. In an automatic switch mechanism the combination with an electric switch member mounted to oscillate about a fixed axis, of a retaining member mounted to oscillate about a fixed axis parallel to said first mentioned axis and arranged to hold said switch member in an operative position, yielding means connecting said switch member and said retaining member and acting in a direction substantially radial with respect to said axis of said retaining member when said switch member is in an operative position, and acting to rotate said switch member into an inoperative position upon being released by said retaining member, releasing means arranged to swing in unison with said retaining member for actuating said retaining member, and movable means arranged to engage said releasing means for actuating the same to release said switch member to permit the same to be moved by said yielding means into an inoperative position.

5. In an automatic switch mechanism, the combination with a movable electric switch member, of a movable retaining member arranged to hold said switch in an operative position, yielding means connected to said switch member and tending to move said switch member to an inoperative position, a movable element, and means frictionally engaging said retaining member and extending into the path of said movable element to transmit motion from said movable element to said retaining member upon the engagement of said movable element with said last mentioned means and by which said last mentioned means may be set to different positions with respect to said retaining member and with respect to said movable element.

6. In an automatic switch mechanism the combination with a movable electric switch member, of a movable retaining member arranged to hold said switch in an operative position, yielding means connecting said switch member and said retaining member, and means arranged to actuate said retain-

ing member to release said switch member and to permit the same to be moved into an inoperative position by said yielding means, said last-named means comprising
 5 a member arranged to move either in unison with said retaining member or independently thereof, and movable means arranged to engage the same to actuate the same.

7. In an automatic switch mechanism, the
 10 combination with a base plate, of an electric switch lever mounted upon one side of said base plate to oscillate with respect thereto about a fixed axis, an electric switch member mounted on the other side of said
 15 plate and rotatable coaxially with said lever, means spaced from said axis and connecting said lever and said member, a movable retaining member arranged to hold said lever in an operative position, yielding
 20 means connecting said switch lever and said retaining member and means for actuating said retaining member to release said switch lever to permit the same to be moved into an inoperative position by said yielding
 25 means.

8. In an automatic switch mechanism the combination with a base plate, of an electric switch lever mounted upon one side of said base plate to oscillate with respect
 30 thereto about a fixed axis, an electric switch member mounted on the other side of said plate and rotatable coaxially with said lever, means spaced from said axis and connecting said lever and said member, a movable retaining member arranged to hold said lever in an operative position, yielding means
 35 connecting said switch lever and said retaining member, means for actuating said retaining member to release said switch lever to permit the same to be moved into an inoperative position by said yielding
 40 means, said last-named means comprising a releasing member movable either in unison with or independently of said retaining member and movable means arranged to engage said releasing means to actuate the
 45 same.

9. In an automatic switch mechanism the combination with a base plate, of a pivot
 50 extending therethrough, a switch lever upon one side of said plate and mounted to oscillate about said pivot, a switch member arranged upon the other side of said plate and mounted to oscillate about said pivot,
 55 means spaced from said pivot and connecting said lever and said member, a retaining member arranged to hold said lever in an operative position, yielding means connecting said switch lever and said retaining member,
 60 and operative to move said switch lever from an inoperative into an operative position upon being released by said retaining member, and means for actuating said retaining member.

85 10. In an automatic switch mechanism the

combination with a base plate, of a pivot extending therethrough, a switch lever upon one side of said plate and mounted to oscillate about said pivot, a switch member
 70 arranged upon the other side of said plate and mounted to oscillate about said pivot, means spaced from said pivot and connecting said lever and said member, a retaining member arranged to hold said lever in an operative position, yielding means connecting
 75 said switch lever and said retaining member and operative to move said switch lever from an inoperative into an operative position upon being released by said retaining member, means for actuating said retaining member, said last-named
 80 means comprising a releasing member movable either in unison with or independently of said retaining member, and movable means arranged to engage said releasing
 85 means to actuate the same.

11. In an automatic switch mechanism, the combination with an electric switch member mounted to oscillate about a fixed axis, of a retaining member mounted to oscillate about a fixed axis and arranged to hold said switch member in an operative
 90 position, yielding means connecting said switch member and said retaining member and operative to move said switch member into an inoperative position upon being released by said retaining member, a releasing member arranged to move coaxially with
 95 said retaining member, and a movable element arranged to engage said releasing member to move said retaining member to release said switch member.

12. In an automatic switch mechanism, the combination of a movable switch, means
 105 tending to move said switch to one position, retaining means holding the aforesaid means from actuating said switch, and releasing means for and connected to said retaining means and movable both with said retaining means to release the same, and
 110 relatively to said retaining means for adjustment.

13. In an automatic switch mechanism, the combination of a pair of co-axially pivoted members, one of which is free, and
 115 a movable switch controlled by the other of said members, said free member moving with said other member under force sufficient to actuate said other member, and also moving relatively to said other member under force sufficient to overcome said friction.

14. In an automatic switch mechanism, the combination with a switch, of mechanism for operating the same including
 125 means tending to move said switch to one position, a retaining member for holding said means from actuating said switch, a releasing member frictionally connected to said retaining member and movable therewith to release the aforesaid means, and
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movable independently thereof into different adjusted positions relative thereto, and movable means for automatically engaging and tripping said releasing member.

5 15. In an automatic switch mechanism, the combination of a switch, yielding means tending to move said switch to one position, a movable retaining member holding said
10 yielding means from actuating said switch, a traveling element, a releasing member located in the path of movement of said traveling element to be tripped thereby, and a frictional connection between said releasing
15 and retaining members to cause the same to move together to release the yielding means, and to permit the former to move independently of the latter for adjustment in the path of the traveling element.

16. In an automatic switch mechanism, the combination with an electric switch having electric contacts, of a member tending to separate said contacts, a movable retaining member arranged to hold said first mentioned member from separating said con-
20 tacts, releasing means arranged to actuate said retaining member to release said first mentioned member, said means comprising a member arranged to move either in unison with said retaining member or independ-
25 ently thereof, and movable means arranged to engage said releasing member.

17. In an automatic switch mechanism, the combination with a switch with electric contacts, of a member for separating said
35 contacts, a retaining member arranged to hold said first mentioned member from separating said contacts, yielding means tending to move said first mentioned member into a position to separate said contacts
40 upon being released by said retaining member, a releasing member, friction means be-

tween said releasing and said retaining members to provide for the adjustment of the relative position of said releasing member with respect to said retaining member, 45 and a movable element arranged to engage said releasing member to move said retaining member and release said first mentioned member.

18. In an automatic switch mechanism, 50 the combination with a fixed and a movable electric contact, of a member for moving said movable contact from a closed circuit position to an open circuit position, a movable retaining member arranged to hold 55 said first mentioned member in one position with said contact points closed, yielding means tending to move said first mentioned member to a second position to move said contacts to an open circuit position, a movable element, and means frictionally engaging said retaining member and extending in the path of said movable element to transmit motion from said movable element to said retaining member upon engagement of 65 said movable element with said last mentioned means, and by which said last mentioned means may be set to different positions with respect to said retaining member and with respect to said movable element. 70

In witness whereof, we have hereunto set our hands this 31st day of October, A. D. 1912.

ELDRIDGE R. JOHNSON.

Witnesses:

FRANK B. MIDDLETON, Jr.,
DONALD G. WOLFF.

HENRY H. MURRAY.

Witnesses:

FRANK B. MIDDLETON, Jr.,
CHARLES F. WILLARD.

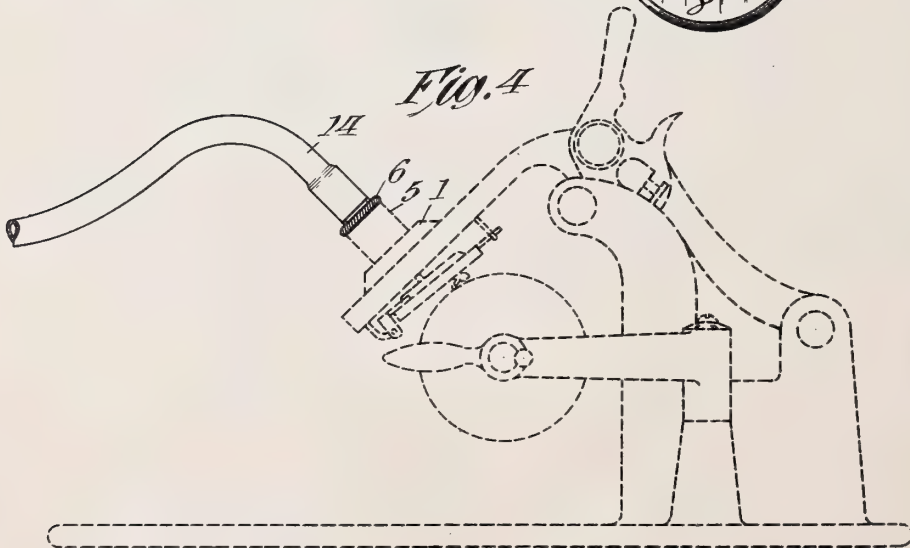
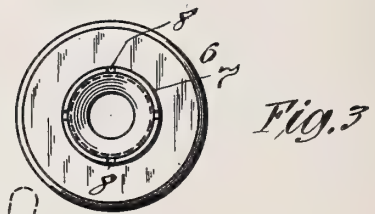
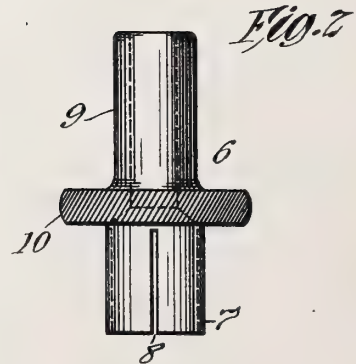
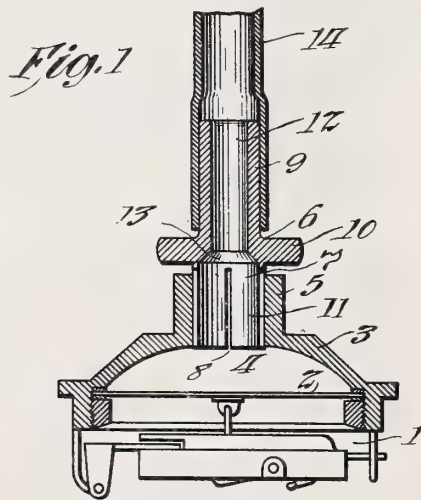
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SOUND MODIFIER,
#1,197,722-----N.C. Durand,
Patented-Sept. 12th, 1916.
Filed-February 10th, 1913.

N. C. DURAND.
SOUND MODIFIER.
APPLICATION FILED FEB. 10, 1913.

1,197,722.

Patented Sept. 12, 1916.



Witnesses:
N. E. Brown.
William A. Hardy.

Inventor:
Nelson C. Durand
by Dyer & Holden
His Attys

UNITED STATES PATENT OFFICE.

NELSON C. DURAND, OF NEWARK, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOUND-MODIFIER.

1,197,722.

Specification of Letters Patent.

Patented Sept. 12, 1916.

Application filed February 10, 1913. Serial No. 747,291.

To all whom it may concern:

Be it known that I, NELSON C. DURAND, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Sound-Modifiers, of which the following is a description.

My invention relates to sound modifiers and more particularly to an improved sound modifier for use in connection with the reproducers of phonographs, especially phonographs employed for commercial purposes.

The principal object of my invention resides in the provision of an improved, simple, and effective device of this character which may be economically and practically manufactured and which is so designed that by an easy manipulation the volume of sounds reproduced may be readily varied or regulated for securing an adjustment to adapt the reproduction to the ears of any particular listener.

Other objects of my invention will appear more fully in the following description and the appended claims.

In order that a clearer understanding of my invention may be had, attention is directed to the accompanying drawing forming a part of this specification in which the same reference characters are used to designate corresponding parts throughout, and in which:

Figure 1 is a central sectional view of a phonograph reproducer and one form of my invention applied thereto; Fig. 2 is a side elevation of the sound modifier of Fig. 1; Fig. 3 is a bottom plan view thereof; Fig. 4 is a side elevation showing in dotted lines a phonograph of the Edison commercial type with the device of Fig. 1 applied thereto and provided with a flexible ear tube.

Referring to the drawings, reference character 1 represents a phonograph reproducer of conventional type in the sound box of which is mounted the usual diaphragm 2. Reference character 3 represents the rear wall of the sound box between which and the diaphragm 2 is formed a resonating chamber 4. The sound box is provided with the usual reproducer neck 5 which extends centrally from the rear wall 3 thereof and the bore of which communicates with the resonating chamber 4.

Reference character 6 represents my im-

proved sound modifier which, as shown, comprises a tubular portion 7 having one or more longitudinal slots or kerfs 8 therein, a preferably reduced tubular portion 9, and a milled or knurled collar 10 intermediate the tubular portions 7 and 9 and preferably formed integrally therewith. The bore 11 of the tubular portion 7 is preferably of greater diameter than the bore 12 in the tubular portion 9 and these bores 11 and 12 are connected by a tapered passageway 13 preferably formed within that part of the modifier forming the collar 10 intermediate the tubular portions 7 and 9.

The outside diameter of tubular portion 7 of the sound modifier 6 is such that this portion will fit frictionally within the bore of the reproducer neck 5. The walls of tubular portion 7 are preferably quite thin and formed of resilient material, such as steel; and, if desired, this tubular portion 7 may be flared outwardly from the collar 10 to a very slight degree in order to increase the frictional resistance between the same and the bore of the reproducer neck when inserted in the latter. Collar 10 serves as a stop for limiting the extent to which the tubular portion 7 of the modifier may be inserted within the reproducer neck 5 as well as providing means whereby the position of the tubular portion 7 within the reproducer neck 5 may be manually adjusted or regulated. The flexible sound-conveying or ear tube 14 may be applied to the tubular portion 9 of the sound modifier to convey the sounds from the reproducer to the ears of the listener.

It will be obvious that the volume of sound conveyed to the operator or other listener will depend largely on the position of the tubular portion 7 within the reproducer neck 5 and that this volume may readily be adjusted to suit any particular listener by properly positioning the tubular portion 7 within the reproducer neck 5 to uncover more or less of the slots or kerfs 8 and thus provide for the escape of more or less of the reproduced sound waves to the atmosphere.

In operating the device, the operator merely applies the same to the reproducer 1 by inserting the tubular portion 7 thereof into the reproducer neck 5. The ear tube 14 is then applied to tubular portion 9 and the volume of sound regulated to suit the

ears of the operator by properly adjusting the position of tubular portion 7 within the reproducer neck.

While I have disclosed the nature of my invention by the illustration and description of but a single form, it will, of course, be understood that the invention is not limited to that form but may be embodied in numerous other forms without departing from the spirit and scope of the invention.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. The combination with a sound box provided with a resonating chamber and a neck extending therefrom, of a sound modifier comprising a member provided with a continuous sound conducting bore therethrough and having a tubular end portion which is connected with said neck for longitudinal adjustment with respect thereto and whereby said member is supported entirely from the sound box, the said tubular end portion being longitudinally slotted whereby more or less of the sound waves may pass directly to the atmosphere according to the position of said tubular end portion with respect to the neck of the sound box, substantially as described.

2. The combination of a sound box having a diaphragm therein providing a chamber in the sound box on one side of the diaphragm and a sound box tube projecting from said chamber, of a sound modifier comprising an open ended tubular member, one end portion of which is adjustably connected with said sound box tube and is longitudinally slotted and the other end portion of which is adapted to be connected with a sound conveyer, said tubular member being provided with unitary means intermediate its end portions for adjusting the same longitudinally with respect to the sound box and for engagement with the sound box tube to limit its movement in one direction, substantially as described.

3. The combination with a sound box and a sound conveyer, of a sound modifier comprising a tubular member having a continuous open-ended bore and forming the sole means of connection between the adjacent

ends of the sound box tube and the sound conveyer, the opposite end portions of said member being connected to said adjacent ends of the sound box tube and sound conveyer respectively, one of such end portions having a longitudinal slot, and said member being longitudinally adjustable with respect to the device with which the slotted end portion thereof is connected to uncover more or less of said slot while maintaining a fixed position with respect to the device to which the other end portion thereof is connected, substantially as described.

4. The combination with a sound box and a sound conveyer, of a sound modifier comprising a tubular member having a continuous open-ended bore and forming the sole means of connection between the adjacent ends of the sound box tube and the sound conveyer, the opposite end portions of said member being connected to said adjacent ends of the sound box tube and sound conveyer respectively, the end portion of said member connected to the sound box tube having a longitudinal slot, and said member being longitudinally adjustable with respect to the sound box tube to uncover more or less of said slot while maintaining a fixed position with respect to said sound conveyer, substantially as described.

5. The combination of a sound box, a sound modifier comprising a tubular member having a continuous open-ended bore and having one end portion thereof connected with the sound box, whereby the tubular member is entirely supported by said sound box, and a sound conveyer connected with and supported by the other end portion of said tubular member, the end portion of said member connected with the sound box having a longitudinal slot and being adjustable longitudinally with respect to the sound box to uncover more or less of said slot, substantially as described.

This specification signed and witnessed this 7th day of February, 1913.

NELSON C. DURAND.

Witnesses:

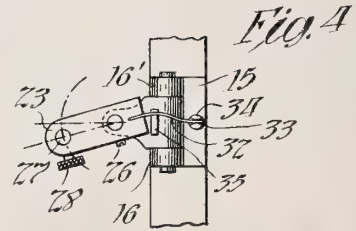
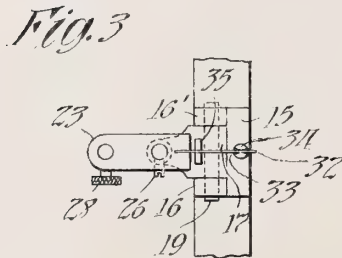
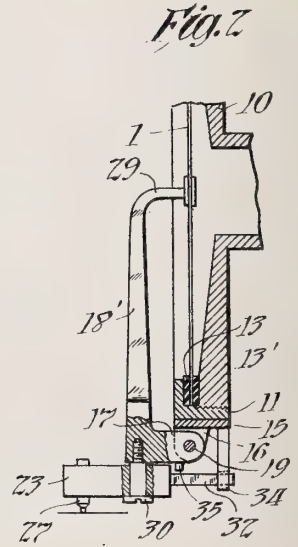
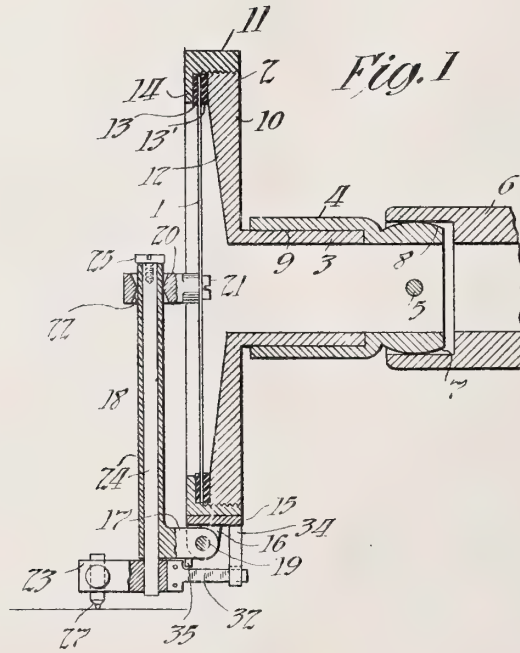
WILLIAM A. HARDY,
MARY J. LAIDLAW.

SOUND BOX,
#1,197,782-----P. Weber,
Patented-September 12th, 1916.
Filed-March 8th, 1911.

P. WEBER.
SOUND BOX.
APPLICATION FILED MAR. 8, 1911.

1,197,782.

Patented Sept. 12, 1916.



Witnesses:
Frank D. Lewis
Frederick Bachmann.

Inventor:
Peter Weber
by Frank L. Rogers
his Atty

UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY.

SOUND-BOX.

1,197,782.

Specification of Letters Patent. Patented Sept. 12, 1916.

Application filed March 8, 1911. Serial No. 613,117.

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a description.

My invention relates to phonograph reproducers, and my object is to provide an improved reproducer wherein the stylus supporting member has great freedom of movement in tracking the grooves of the sound record and wherein a stylus mounting of very small inertia is obtained.

More particularly, the object of my invention is to provide a reproducer which may be mounted on a mechanically fed swinging arm; and which although secured against lateral movement will permit the stylus to follow or track the record groove regardless of its irregularities.

In carrying out my invention, a device is provided which renders it unnecessary to move any parts other than the stylus supporting member itself, when said member is oscillated laterally to the record groove in tracking the same. Furthermore, means are provided by my invention for locating the stylus centrally of the record groove after a deviation from this central position in tracking the groove.

Other objects of my invention are the provision of improved details of construction and combinations of parts hereinafter more fully described and claimed.

In order that my invention may be more clearly understood, reference is hereby made to the accompanying drawings, illustrating a preferred form thereof, and in which:

Figure 1 is a central vertical section of a reproducer embodying my invention, some of the parts being shown in side elevation; Fig. 2 is a view similar to Fig. 1 of a modification; Fig. 3 is a fragmentary bottom plan view of the device illustrated in Fig. 1, the stylus supporting member being shown in its central position; and Fig. 4 is a similar view of the parts shown in Fig. 3, the stylus supporting member being shown deviated from its central position.

In all of the views, corresponding parts are designated by the same reference numerals.

Referring to the drawing, the diaphragm 1 is secured to a body member 2 provided

with an annular flange 3 which is securely held within a tubular member 4.

5 represents a pivot whereby the member 4 and the parts secured thereto are connected for vertical movement to the tone arm 6 of the phonograph.

In order to facilitate the movement of the reproducer with respect to the supporting arm and at the same time insure a good connection between these parts, a socket 7 is provided in the end of the arm 6 and the member 4 is provided with a spherical surface 8 engaging the wall of the said socket.

As shown in Fig. 1, the flange 3 is seated in a recess 9 in the member 4, and a sound passage of substantially uniform diameter extends from the flange 3 into the arm 6.

The body 2 comprises a member 10 and an annular member 11 threaded to the periphery of the member 10, the latter being provided with a conical forwardly extending surface 12 adapted to form a tapering sound chamber in the rear of the diaphragm. Two annular gaskets 13, 13' are placed on opposite faces of the diaphragm at the periphery thereof, and together with the diaphragm are clamped between the member 10 and the flange 14 on the member 11.

Secured to the lower portion of the outer curved surface of the member 11 is a bracket 15 provided with parallel lugs 16, 16', between which the arm 17 projecting substantially at right angles from the body of the elongated lever 18 is pivotally mounted by means of a pivot 19.

Referring to Fig. 1, 20 represents a projection extending from the center of the diaphragm, and secured thereto by a screw or other suitable fastening means 21. This projection is provided transversely thereof with a vertical opening 22 flaring outwardly from the center to both of its extremities, the long arm of the lever 18 being slidably mounted in the said opening. By the employment of a connection of this type between the lever 18 and the diaphragm, the free backward and forward vibration of the diaphragm is not disturbed by the angularity of the lever 18 with respect thereto. In the form of my invention shown in this figure, the lever 18 is made tubular and the stylus supporting arm 23 is pivotally connected therewith by a shaft 24 rotatably mounted in the opening in said lever and held from downward movement therein by

a set screw 25 secured in the end of said shaft and engaging the top of the said lever. The arm 23 is preferably secured to the shaft 24 by a set screw 26 and carries in its forward end a stylus 27 held in place by a set screw or other fastening means 28. Since the distance from the fulcrum of the lever to the point of connection of the latter with the diaphragm is considerably greater than the distance from the said fulcrum to the stylus, the up and down movement communicated to the stylus by its engagement with the record groove, will be communicated to the diaphragm 1 with increased amplitude; and since the stylus, the arm 23 and the shaft 24 are the only parts moved laterally by the record groove in the reproduction of a record, a stylus mounting having but little inertia and great freedom of movement is obtained.

Referring to Fig. 2, the lever 18' is provided at its upper end with a rearwardly turned portion 29 secured to the diaphragm 1. In this modification, the arm 23 is pivotally mounted on a set screw or similar support 30 screwed into the lower end of the lever 18' in alinement with the long arm of the said lever, the head of said set screw engaging the lower surface of said arm. The stylus 27 is secured to the arm 23 as in the form of my invention shown in Fig. 1.

In both of the modifications hereinbefore described, a spring 32 is secured to and extends rearwardly from the stylus supporting arm, the outer end of this spring being slidably engaged between the opposing convex surfaces forming the walls of the notch 33 in the lug 34 which extends downwardly from the bracket 15. Movement of the stylus supporting arm to either side of its normal axial position bends the spring 32, as shown, for example in Fig. 4, so that as soon as the deviating force is removed from the said arm, the latter is returned by the spring to its normal position. A stop 35 on the lower end of the lever 18 (or 18') is adapted to be engaged by the rear vertical edges of the stylus supporting arm to limit the oscillation of said arm to prevent breaking of the spring 32 or removal of the same from the notch 33.

It is understood that my invention is not limited to the precise device or construction shown, but may be varied within the scope of the appended claims without departing from the spirit of my invention.

Having now described my invention, what I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. In a sound box, the combination of a diaphragm, a support therefor, a lever fulcrumed on said support and connected with the center of said diaphragm, said lever having an opening extending longitudinally

therethrough, a shaft mounted in said opening to normally turn freely therein, and a stylus arm secured to said shaft, substantially as described.

2. In a sound box, the combination of a diaphragm, a support therefor, a lever fulcrumed on said support and connected with the center of said diaphragm, said lever having an opening extending longitudinally therethrough, a shaft rotatably mounted in said opening, a stylus arm secured to said shaft, and yielding means for centering said arm, substantially as described.

3. In a sound box, a diaphragm, a support therefor, a projection extending from the center of said diaphragm and provided with a transverse opening flaring from the center to both of its extremities, and a stylus lever fulcrumed on said support, and extending slidably through said opening, substantially as described.

4. In a sound box, the combination of vibratory means, a support therefor, a stylus arm connected with said means and adapted to vibrate the same, said arm being free to oscillate laterally with respect to said vibratory means in a plane substantially at right angles to said means and without imposing stress thereon, yielding means for centering said arm, and a stop to limit the oscillation of said arm, substantially as described.

5. In a sound box, the combination of vertically disposed vibratory means, a support therefor, a lever connected with said vibratory means and pivotally mounted on said support for movement about a horizontal axis to vibrate said means, and a stylus carrying member supported by said lever so as to oscillate laterally with respect thereto about an axis at an angle to the horizontal and in a plane at an angle to said vibratory means without imposing stress thereon and without moving the stylus from operative position, substantially as described.

6. In a sound box, the combination of vibratory means, a support therefor, a stylus arm connected with said means and adapted to vibrate the same, said arm being arranged to oscillate freely in a plane at an angle to said vibratory means without imposing stress thereon and without moving the stylus from operative position, and yielding means for centering said arm, substantially as described.

7. In a sound box, the combination of vibratory means, a support therefor, a lever pivoted on said support and connected with said vibratory means, a stylus arm supported by said lever so as to freely oscillate laterally with respect thereto in a plane at an angle to said vibratory means without imposing stress thereon and without moving the stylus from operative position, and

yielding means for centering said arm, substantially as described.

8. In a sound box, the combination of vibratory means, a support therefor, a lever
5 pivoted on said support and connected with said vibratory means, and a stylus-carrying member supported by said lever for pivotal movement in a plane at an angle to the vibratory means without moving the stylus
10 from operative position, said member having connection with said vibratory means through said lever, substantially as described.

9. In a sound box, the combination of
15 vibratory means, a support therefor, a lever pivoted on said support and connected with said diaphragm, and a stylus carrying member supported by said lever so as to be free to oscillate about an axis at an angle to the
20 axis of the pivot of said lever and in a plane

at an angle to said vibratory means without imposing stress thereon and without moving the stylus from operative position, substantially as described.

10. In a sound box, the combination-of 25 vibratory means, a support therefor, a lever pivoted on said support and connected with said diaphragm, and a stylus carrying member supported by said lever so as to be free to oscillate in a plane at an angle to said 30 vibratory means without imposing stress thereon, said member having connection with said vibratory means through said lever, substantially as described.

This specification signed and witnessed 35 this 7th day of March, 1911.

PETER WEBER.

Witnesses:

FREDERICK BACHMANN,
ANNA R. KLEHM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SWEEPER FOR RECORDS OF TALKING MACHINES,
#1,198,127-----A. Herrman,
Patented-Sept. 12th, 1916.
Filed-November 12th, 1915.

A. HERRMAN.
SWEEPER FOR RECORDS OF TALKING MACHINES.
APPLICATION FILED NOV. 12, 1915.

1,198,127.

Patented Sept. 12, 1916.

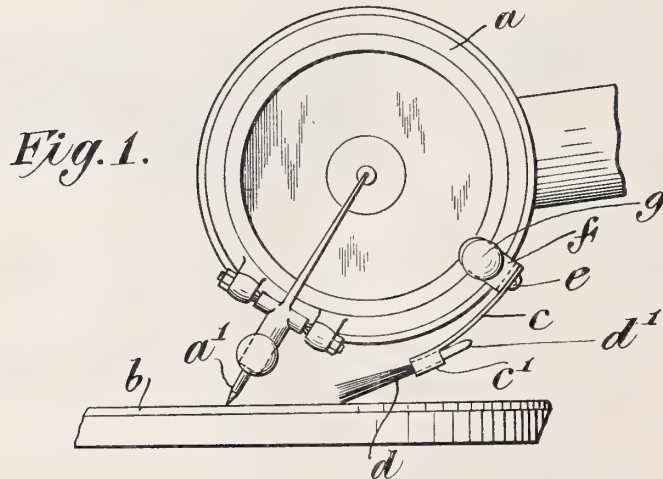


Fig. 2.

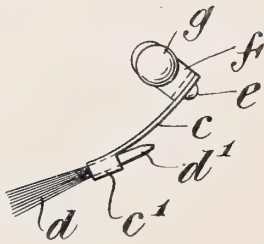


Fig. 4.

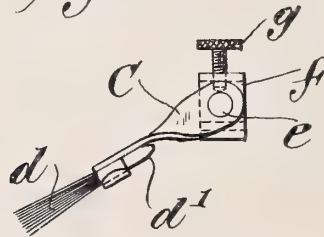


Fig. 3.

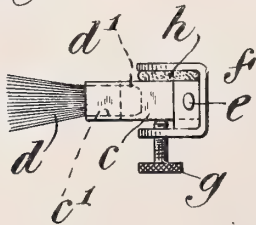
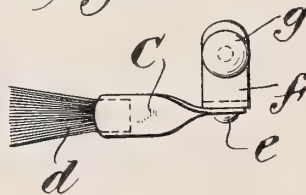


Fig. 5.



WITNESS
Joseph Schwarz

INVENTOR
Arthur Herrman
BY
Reading, Butler & Goodlett
ATTORNEYS

UNITED STATES PATENT OFFICE.

ARTHUR HERRMAN, OF NEW YORK, N. Y.

SWEEPER FOR RECORDS OF TALKING-MACHINES.

1,198,127.

Specification of Letters Patent. Patented Sept. 12, 1916.

Application filed November 12, 1915. Serial No. 61,154.

To all whom it may concern:

Be it known that I, ARTHUR HERRMAN, a citizen of the United States, residing in the borough of Manhattan of the city of New York, in the State of New York, have invented certain new and useful Improvements in Sweepers for Records of Talking-Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

It is well known that records for talking machines and particularly disk records are liable to become very dusty by the deposit of dust and foreign particles in the grooves and that this deposit seriously affects the tone of the machine. This difficulty is usually met in some small degree by a preliminary wiping of the record before it is placed on the turn-table but this wiping probably aggravates the trouble rather than diminishing it, since the dust is thereby compressed in the grooves and the clogging accentuated. It has been proposed to remedy the trouble by employing a wiper of cloth which might be drawn over the grooves, but such a device is open to the same objection as that pointed out with respect to the usual hand dusting.

The present invention has for its object to provide a sweeper which shall be readily attachable to the sound box and arranged in such relation to the needle as to effectively dislodge and remove all dust and foreign particles from the groove just before the needle reaches the particular portion of the groove to be played. The sweeping thus accomplished is carried on, in accordance with the present invention, by a brush which is composed of bristles which are caused to enter the grooves and rest on the very bottoms of the grooves so as to insure the removal of every particle of dust therefrom.

The invention seeks further to provide an efficient self sweeper of the character indicated which may be readily attached to or detached from sound boxes of any type on machines adapted for the playing of records having hill and dale grooves or laterally cut grooves.

The improved device has embodied therein a swiveled connection between the brush proper and its support, whereby the brush may be swung to an inactive position out of engagement with the record without necessitating the removal of the entire brush and its support from the sound box.

Other features of construction will appear in greater detail hereinafter in connection with the description of the accompanying drawings, in which—

Figure 1 is a fragmentary view in side elevation of a tone arm and sound box of one common type showing the improved sweeper attached to the sound box. Fig. 2 is a detail view in side elevation of the improved sweeper. Fig. 3 is a detail view in plan of the sweeper shown in Fig. 2. Fig. 4 is a detail view of a sweeper of slightly modified construction which is especially adapted for use on sound boxes of talking machines in which the records have grooves of the hill and dale type. Fig. 5 is another view of the sweeper shown in Fig. 4.

The sound box *a*, indicated in Fig. 1, is intended for use on records *b* in which the grooves are formed with lateral recesses and the application of the improved sweeper to such a sound box will first be considered before reference is made to the form of sweeper shown in Figs. 4 and 5, which is intended for use on a sound box constructed for the playing of records having hill and dale grooves. The sweeper comprises a support *c*, on one end of which is provided a suitable holder *c'* into which the brush *d* may be slipped and removably retained therein. The support *c* for the brush has a swiveled connection as through a pivot or stud *e* with a suitable clamp *f* of such form as to embrace the rim of the sound box *a*. In the illustrated embodiment, the clamp *f* is formed as a channeled member, the web of which may rest against the periphery of the sound box and the sides of which may engage, respectively, the front and rear faces of the sound box. In order to hold this clamp firmly in position there is provided a set screw *g* which passes through one side of the channeled clamp *f* and engages releasably the face of the sound box. If desired, the opposite side of the channeled clamp *f* may be provided with a suitable pad *h* of soft material arranged to lie directly against the side of the sound box and afford a more satisfactory engagement of the clamp with the sound box. In this connection, it is to be observed, that the invention is not to be limited to the precise details of construction described, inasmuch as the clamp might be formed as a spring member adapted to engage the sound box yieldingly and, through its resiliency, maintain itself in position. A

positive clamp, in use, such as that effected by the set screw *g* has been found to be satisfactory. The invention is not to be limited to the precise character of the brush *d* either, except that this brush should be formed of stiff bristles fixed securely in a suitable holder *d'* so as to facilitate the introduction of this holder into the retaining piece *c'* of the support *c*. When the bristles *d* become worn, the brush may be readily removed from the retaining member *c'* and replaced by a fresh brush, at very slight expense.

In use, the improved sweeper is attached to the rim of the sound box *a* by placing the clamp *f* in proper position thereon and setting up on the set screw *g*, the brush *d* being thereby placed in substantially the same plane with the needle *a'*, as is desirable. The position of the clamp *f* on the sound box is such as to bring the bristles *d* into engagement with the face of the record *b* at a point slightly in advance of the needle *a'*. The bristles of the brush *d* being thus pressed into the grooves of the record enter into the very bottoms of the grooves and effectively remove all dust and foreign particles therefrom just prior to the passage through the successive portions of the groove of the needle *a'*. In this way, it is insured that the groove shall be absolutely clean at each point when the needle reaches it and the resulting tone will be unimpaired in the manner now so common through the engagement of the needle with dust, etc., in the grooves. After a record has been played, it may be desirable to repeat and in such case where the sweeping has been effected, it is unnecessary to keep the brush in its sweeping position. In such case, it may readily be swung about the pivot *e* to one side of the sound box by a simple manipulation with the finger in a manner which will be evident. When thus moved out of engagement with the record it may be permitted to remain there without objection, inasmuch as the entire structure is relatively small and does not affect the functioning of any of the other parts of the machine.

The sweeper shown in Figs. 4 and 5, as indicated before, is especially designed for use on machines in which the needle vibrates vertically rather than laterally. In such machines, the sound box is usually disposed in a plane at right angles to the plane of

the sound box shown in Fig. 1. To meet this change, the support *c* for the brush *d* is twisted so as to hold the brush *d* in a plane at right angles to the plane of the web of the channeled clamp *f*, the construction of which, in all other respects, remains as described in connection with the sweeper shown in Figs. 2 and 3. The clamp *f* is secured to the rim of the sound box of the type now under discussion in the same way as was described in connection with Fig. 1 and the brush *d* by reason of the twist in the support *c* will rest on the record just in advance of the needle in precisely the manner heretofore described.

It will be evident that changing conditions of use may require that the configuration of the constituent parts of the improved sweeper, namely, the clamp *f*, the support *c*, the retaining member *c'* and the holder *d* for the bristles, will not have to be changed, but such changes may readily be made by one skilled in the art. Further, modifications involving only the exercise of mechanical skill in any one of the elements shown may suggest themselves, but all changes in configuration and form are to be deemed within the scope of this invention provided the designated objects are accomplished in substantially the manner pointed out in this specification and illustrated in the drawings.

I claim as my invention:

1. In combination with a sound box for talking machines, a sweeper for the records, comprising a channeled clamp, a pad carried on one of the sides thereof to engage the face of the sound box when the clamp is positioned on its rim, a set screw to hold the clamp in position, a support pivotally connected to the clamp, a retaining socket on the support, a brush, and a holder for the brush disposed in said socket.

2. In combination with a sound box for talking machines, a sweeper for the records, comprising a channeled clamp, a pad carried on one of the sides thereof to engage the face of the sound box when the clamp is positioned on its rim, a set screw to hold the clamp in position, a support pivotally connected to the clamp, a spring retaining socket on the support, a brush, and a holder for the brush disposed in said socket.

This specification signed this 11th day of November, A. D. 1915.

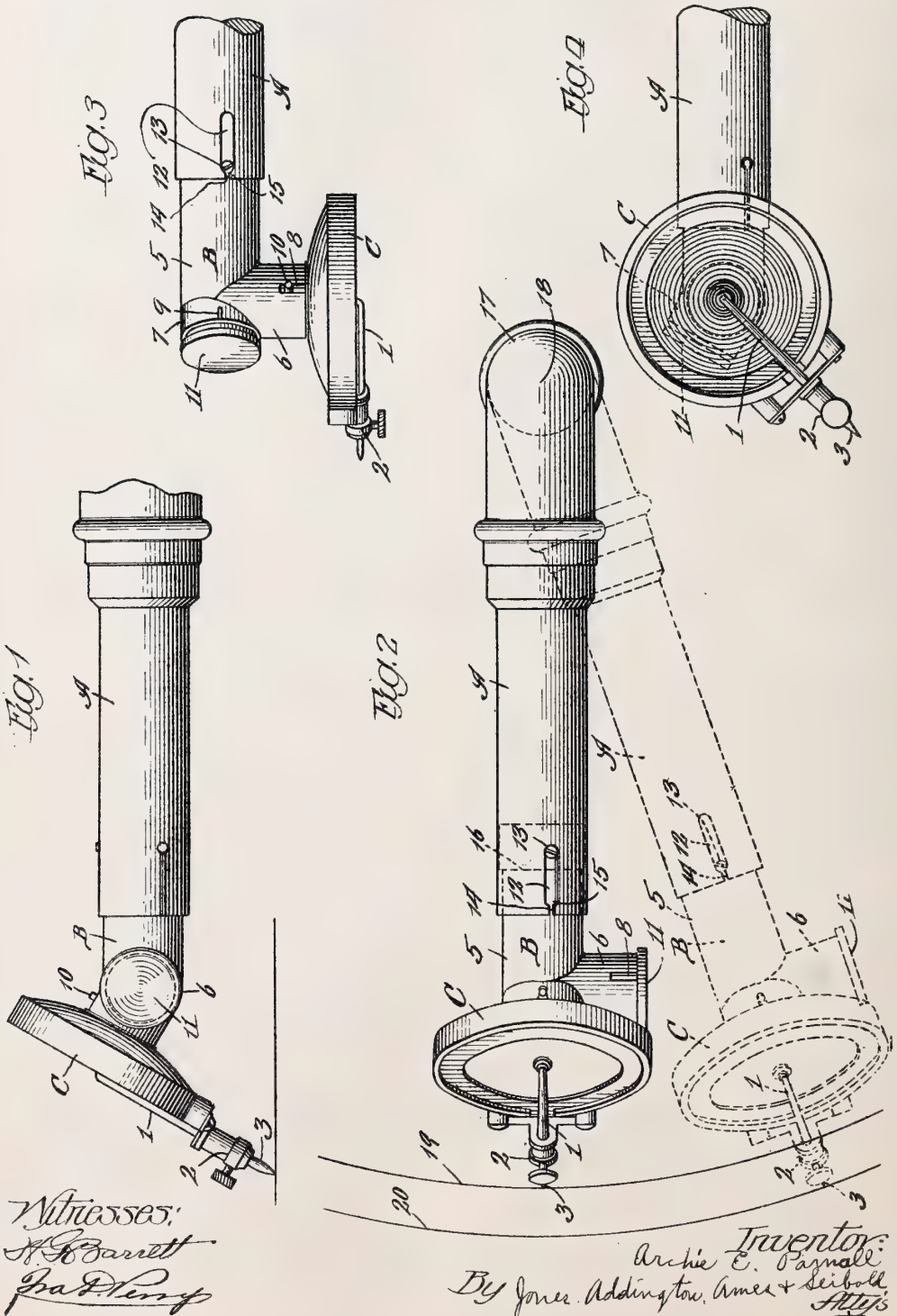
ARTHUR HERRMAN.

CONVERTIBLE SOUND BOX,
#1,198,265-----A.E. Barnall,
Patented-Sept. 12th, 1916.
Filed-March 22nd, 1915.

A. E. PARNALL.
 CONVERTIBLE SOUND BOX.
 APPLICATION FILED MAR. 22, 1915.

1,198,265.

Patented Sept. 12, 1916.



UNITED STATES PATENT OFFICE.

ARCHIE E. PARNALL, OF CHICAGO, ILLINOIS, ASSIGNOR TO FRANK W. WILLIAMS, OF CHICAGO, ILLINOIS.

CONVERTIBLE SOUND-BOX.

1,198,265.

Specification of Letters Patent.

Patented Sept. 12, 1916.

Application filed March 22, 1915. Serial No. 16,282.

To all whom it may concern:

Be it known that I, ARCHIE E. PARNALL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in a Convertible Sound-Box, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to improvements in attachments for talking machines with specific reference to convertible sound boxes, and has for its object the production of a device by means of which the same sound box may be readily and quickly adjusted to play a record of the "hill and dale" type or one of the "laterally undulating groove" type.

A further object is the production of a device that may be readily and quickly attached to a machine, that consists of the minimum number of parts, can be cheaply constructed and not liable to get out of order.

These and such other objects as may hereinafter appear are obtained by my device, an embodiment of which is illustrated in the accompanying drawings, in which—

Figure 1 represents a side elevation of my device in connection with a reproducer or sound box and a portion of the sound conduit or arm of a talking machine, showing my device in position to operate on a record of the "hill and dale" type; Fig. 2 represents a top plan view of Fig. 1 showing the entire sound conduit and also showing a different position of the reproducer or sound box; Fig. 3 represents a top plan view similar to Fig. 2, but showing the reproducer or sound box in position to operate on a record disk of the "laterally undulating groove" type; and Fig. 4 represents a side elevation of Fig. 3.

Like numerals of reference refer to like parts in the several figures of the drawings.

Referring now to the drawings A represents a sound conduit; B represents my improved connecting member, and C a reproducer or sound box, the reproducer having

an ordinary needle arm 1, a needle support 2 and a needle 3. The sound box also is provided with a rearwardly extending tube adapted to fit in either one of the openings in the member B. This member B, above referred to, comprises substantially an elbow pipe or tube having a body or main portion 5, a side member 6 and an end member 7, the side member 6 extending at right angles to the body or main member 5, and the member 7 being bent upwardly as shown clearly in Fig. 4; the purpose of this being that this angle is best adapted to retain the sound box in proper position when in use on the machine. The member 6 is slotted, as shown at 8, and the member 7 is slotted at 9, these slots being adapted to engage a pin 10 mounted on the engaging end 4 of the sound box and serving to hold the reproducer or sound box against lateral motion when the reproducer is slipped in place within the open tubes. A cap 11 is provided adapted to fit in or over the open end of the member B, that is the end that remains open when the reproducer is in operative position, the purpose being to prevent any escape of the sound which enters through the member B and into the sound conduit or arm A. The sound conduit or arm A is provided with a plurality of slots shown at 12 and the member B is provided with a screw hole within which is mounted a screw 13 holding the member B in sliding connection with the arm A. The slots 12 narrow at their extreme outer end as shown at 14, thus making it impossible for the member B to slip off of the arm as the screw 13 would strike against the constricted portion of the groove at 15. The member B is preferably provided with a slight shoulder, as shown at 16, providing for a snug fit within the sound conduit.

Referring now to Fig. 2 it will be noted that the inner end of the arm or conduit is provided with a universal joint at 17, thus permitting the arm to travel horizontally and vertically. The arm consequently revolves about a center 18, and reference to Fig. 2 shows that with the sound box in the position indicated in full lines the circum-

ference of the circle over which the needle travels is indicated at 19. It will be noted that in this position the sound box mounted on the member B is slipped into the sound conduit A as far as it can go, further movement being prevented by the engagement of the screw 13 against the end of the groove.

When the reproducer is in the position shown in Figs. 3 and 4, the circumference of travel of the needle point is over the same line 19, as shown in full lines; the member B, however, being slipped out and occupying the position shown in dotted lines in Fig. 2. When the sound box is taken off with the arm in that position and replaced on the bent up end it is first in the position shown in the dotted lines in Fig. 2, the circumference of travel then being along the line 20. In order to give the needle point the same radius in all cases, the reproducer and the member B are slipped back into the position shown in full lines in Fig. 2. It will thus be seen that by reason of this adjustable feature the reproducing needle is made to travel over the same circumference regardless of the position the sound box occupies with respect to the member B.

In Fig. 2 I have shown the cap 11 on the end of the open member 6, while in Fig. 3 it is shown on the end of the member 7, the idea being that at all times when the machine is being played the cap must be in position over the open end.

The necessity for a device of this character is well understood by reason of the fact that there are two well recognized types of records that are used interchangeably on machines. The Edison disk record is of the type known as the "hill and dale", meaning that the bottom of the record groove on which the sound is recorded is undulatory in form, the various modifications and characteristics of the sound being recorded vertically in the material at the bottom of the groove. In the other type of disks, known as the Columbia or Victor the record is made on the side of the groove and the needle vibrates horizontally while the sound is recorded or reproduced, while in the former case the vibration is vertical. In both cases, however, the arm with the reproducer or recorder is moved toward the center of the disk by the revolution of the disk itself, the needle engaging the spiral groove of the record. The existence of these conditions makes it essential that the sound arm of a machine be fitted in such a manner as to permit the playing of these different types of records and also fitted in such a manner as to permit ready and accurate adjustment of parts. These results, it will be seen, are accomplished by the use of my improved de-

vice as it only requires an instant to remove the reproducer from the side member when it has been used in playing a Victor record, as shown in Fig. 3, and transfer it to the position shown in Fig. 1 ready to play an Edison record.

A device of this character is extremely valuable in that it increases the capacity of the machine and makes available to the owner of a single machine all of the records of these types on the market.

While I have shown a very simple embodiment of my device it is evident that modifications might be made and accomplish similar results by other means, but any such means would be well within the scope of my invention.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. A reproducing machine comprising a swinging tubular tone-arm, a sound-box having a diaphragm and a tubular portion connected therewith and means for connecting said sound-box to said tone-arm comprising a member having three communicating tubular portions, the first of said portions telescopically engaging said tubular tone-arm, the second tubular portion inclined upwardly and outwardly with respect to the axis of said tone-arm, and the other tubular portion extending substantially horizontally and laterally with respect to said first tubular portion, said second tubular portion being constructed to engage the tubular portion of the sound-box to hold the sound-box in inclined position with its diaphragm extending transversely to the axis of the tone-arm for use with a "hill and dale" record, and said third portion being constructed to engage the tubular portion of the sound-box to hold the sound-box with its diaphragm in a plane substantially parallel to the axis of the tone-arm for use with a laterally undulating groove record.

2. A reproducing machine comprising a swinging tubular tone-arm, a sound-box having a diaphragm and a tubular portion connected therewith, and means for connecting said sound-box to said tone-arm comprising a member having three communicating tubular portions, the first of said portions telescopically engaging said tubular tone-arm, the second tubular portion inclined upwardly and outwardly with respect to the axis of said tone-arm, and the other tubular portion extending substantially horizontally and laterally with respect to said first tubular portion, said second tubular portion being constructed to engage the tubular portion of the sound-box to hold the sound-box in inclined position with its diaphragm extending transversely to the

axis of the tone-arm for use with a "hill
and dale" record, and said third portion
being constructed to engage the tubular por-
tion of the sound-box to hold the sound-box
5 with its diaphragm in a plane substantially
parallel to the axis of the tone-arm for use
with a laterally undulating groove record,

the first tubular portion of said connecting
means being slidably adjustable with re-
spect to the tone-arm.

In witness whereof I have hereunto sub-
scribed my name.

ARCHIE E. PARNALL.

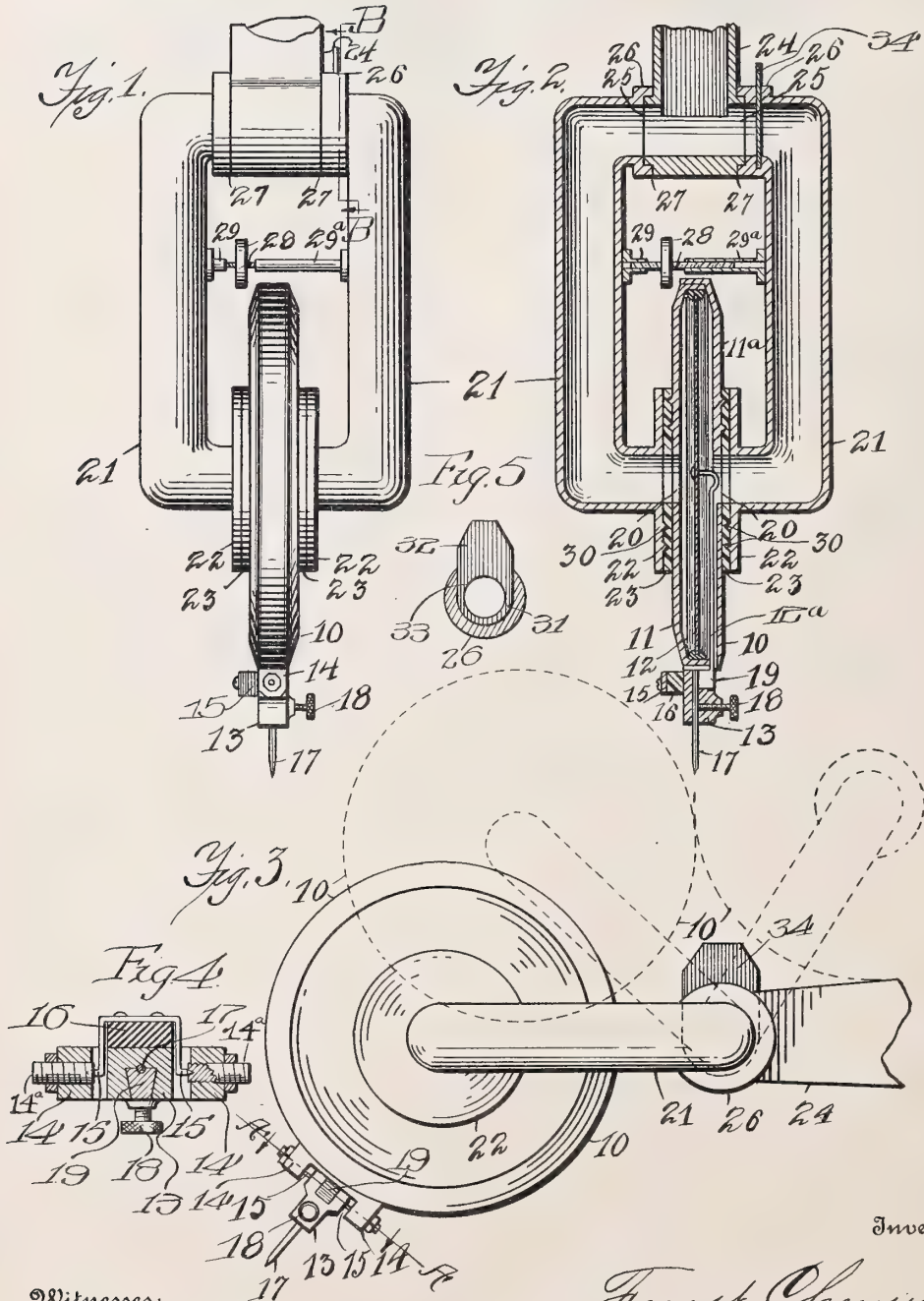
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

SOUND REPRODUCING MACHINE,
#1,198,416-----F. Cheney,
Patented-Sept. 19th, 1916.
Filed-October 30th, 1912.

F. CHENEY.
SOUND REPRODUCING MACHINE.
APPLICATION FILED OCT. 30, 1912.

1,198,416.

Patented Sept. 19, 1916.



Witnesses:

Arthur O. Frome
G. W. Warner Jr.

Inventor:

Forrest Cheney
By John Howard McElroy
his Attorney

UNITED STATES PATENT OFFICE.

FOREST CHENEY, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
CHENEY TALKING MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION
OF ILLINOIS.

SOUND-REPRODUCING MACHINE.

1,198,416.

Specification of Letters Patent. Patented Sept. 19, 1916.

Application filed October 30, 1912. Serial No. 728,571.

To all whom it may concern:

Be it known that I, FOREST CHENEY, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a full, clear, and exact specification.

My invention is concerned with certain new and useful improvements in sound reproducing machines, and more especially with the connections between the needle holder and the sound box.

My invention consists of a novel mounting of the needle holder upon the sound box so that the needle and the connecting needle arm can vibrate freely, but without the possibility of any metallic or harsh sound passing to the tone arm.

To illustrate my invention, I annex hereto a sheet of drawings, in which the same reference characters have been employed to designate identical parts in all the figures, of which,—

Figure 1 is a top plan view of the sound box and immediate connections of a sound-reproducing machine, but with the sound box turned about sixty degrees from its normal position in the supporting tubes so as to show more clearly the needle holder and its connections; Fig. 2 is a similar view, with the sound box correspondingly displaced, but in central horizontal section; Fig. 3 is a side elevation, with the sound box in its proper position; Fig. 4 is a detail in section on the line A—A of Fig. 3; and Fig. 5 is a detail in section on the line B—B of Fig. 1.

In carrying out my invention, I employ a sound box 10, which may be conveniently constructed of two shallow, cup-shaped metallic disks 11 and 11^a, which disks have on their peripheries flanges of the proper size so that the disk 11^a can fit snugly over the disk 11, and hold the rubber or other gasket 12^a, which in turn receives the diaphragm 12 in place so that the latter extends across the center of the sound box and parallel to the inner walls thereof.

The shell 11^a is provided on its periphery with a pair of lugs or ears 14, through which are screwed the adjusting screws 14^a, which have recessed ends to serve as a bearing for the pointed ends of the generally U-shaped,

spring-supporting member 15, which has secured thereto the needle holder 13 with the block 16 of rubber or some similar material interposed to deaden any possible vibrations of the metal. A set screw 18 is threaded through a suitable aperture in the side of the needle holder 13 and coöperates with the needle 17, which is set in the longitudinal recess extending through the needle holder 13 in the customary manner. The sound bar or needle arm 19 is rigidly secured in the needle holder, so that the vibrations of the needle are transmitted by the arm to the center of the diaphragm 12, to which center the other end of the sound bar or needle arm is connected in the customary manner.

The sound box has suitable apertures 20 formed in the center of its sides, and surrounding these apertures are the rubber or other sound-deadening annular disks 23, against the outer surfaces of which are pressed the disks 22 of the tubular arms 21 which serve to connect the sound box with the tone arm or horn 24. The inner faces of the disks 22 and the outer faces of the shells 11 and 11^a of the sound box are provided with suitable prongs 30, or the surfaces otherwise roughened so that the prongs will engage the disks 23 and hold the sound box between the arms 21 so that there can be no possible rattling. The arms 21 are of a general U-shape, and the ends have annular flanges 26 which take over and fit somewhat snugly on the similar annular flanges 25 formed on the end of the tone arm 24, as best shown in Fig. 2. To draw the ends of the tubular arms 21 on the tone arm 24 and on the sound box 10, I secure on the inner sides of the arms 21 the right and left hand nuts 29 and 29^a, and in these nuts are threaded the right and left hand screw 28, which is provided with a suitable intermediate disk or head by which it can be turned to tighten or loosen the pressure, as may be desired.

From the foregoing description, it will be noted that the diaphragm 12 is so connected with the tone arm or horn 24 that all the condensations and rarefactions of the air produced on both sides of the diaphragm by its vibrations have a direct passage to the tone arm, so that said condensations and rarefactions, or vibrations of the air, can

be transmitted freely and utilized to the fullest extent in reproducing whatever record is being run beneath the needle 17. It will also be noted that, with the construction herein shown and described, the sound box can be swung about the joint between the arm 21 and the tone arm or horn 24 as a center, and thus the sound box can be lifted up, to change the needle or replace the record, through and into the dotted-line positions shown in Fig. 3.

As it may sometimes happen that I wish to diminish the volume of the sound reproduced, I may employ in connection with the structure heretofore described, means for closing one of the tubes 21 leading from the sound box to the tone arm, and a convenient structure for this purpose is to enlarge one of the flanges 26 and cut therein a groove 31, and when both sides of the diaphragm are to be used, this groove 31 is filled by the plate 32, shown in Fig. 5, which has therein a circular aperture 33 of the same diameter as the internal diameter of the tubes 21, so that when said plate is shoved into place, there is no material obstruction of the passage. When, however, it is desired to shut off one side and reduce the volume thereby substantially one-half, I take out the plate 32 having the aperture 33, and substitute therefor a similar plate 34, shown in

Fig. 2, which plate, however, lacks the aperture 33, so that its insertion in the groove completely shuts off that side of the passage leading to the sound box.

While I have shown and described my invention as embodied in the form which I at present consider best adapted to carry out its purposes, it will be understood that it is capable of modifications, and that I do not desire to be limited in the interpretation of the following claims except as may be necessitated by the state of the prior art.

What I claim as new, and desire to secure by Letters Patent of the United States, is:

In a sound-reproducing machine, the combination with a sound box, of a diaphragm mounted therein, a needle holder, a needle arm connecting the holder to the diaphragm, ears supported from the sound box, set screws mounted in the ears, a U-shaped spring support for the needle holder pivoted in the ends of the set screws, and a block of damping material interposed between the spring support and the needle holder.

In witness whereof, I have hereunto set my hand and affixed my seal, this 25th day of October, A. D. 1912.

FOREST CHENEY. [L. s.]

Witnesses:

JOHN HOWARD MCELROY,
MILDRED ELSNER.

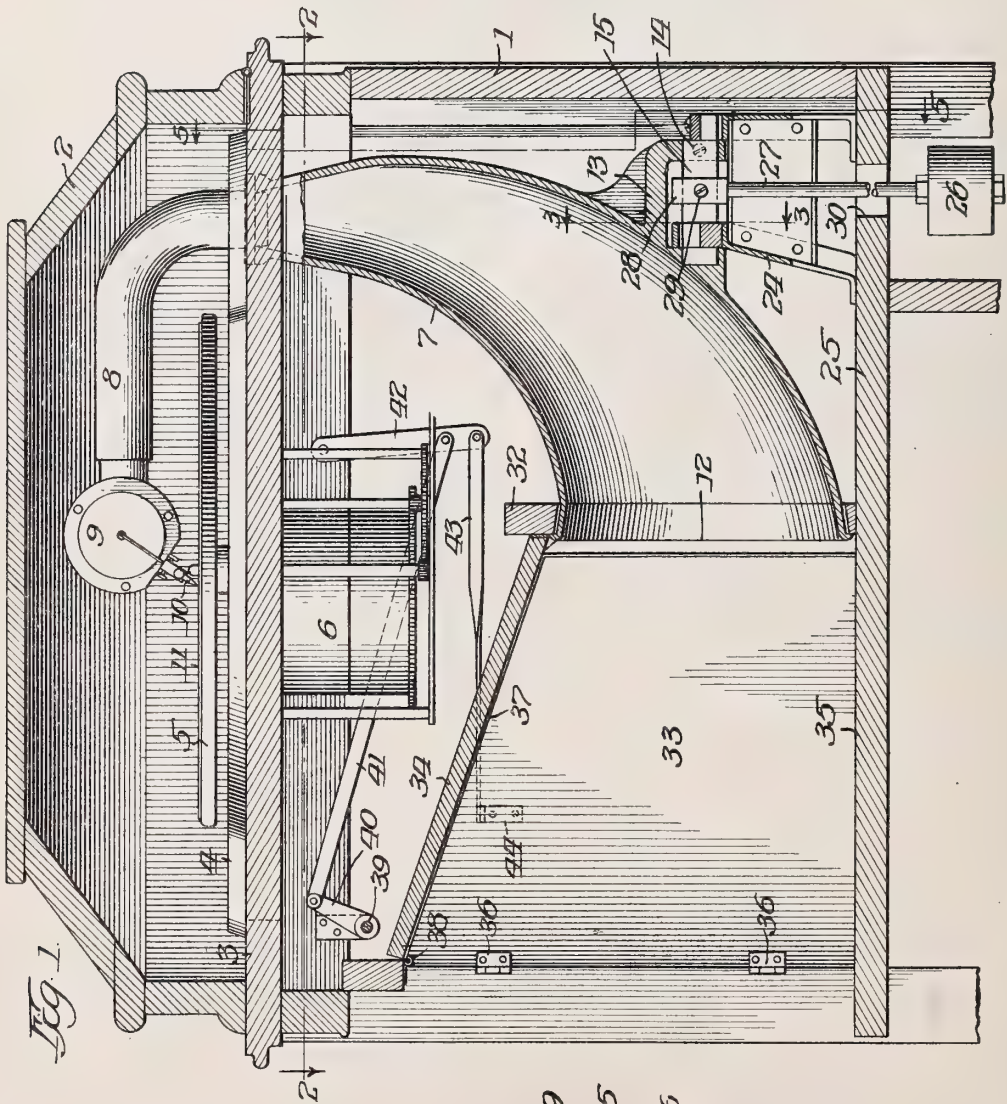
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TALKING MACHINE,
#1,198,464-----L. Lumiere,
Patented-September 19, 1916.
Filed-December 17, 1915.

A. A. HUSEBY.
TALKING MACHINE.
APPLICATION FILED DEC. 17, 1915.

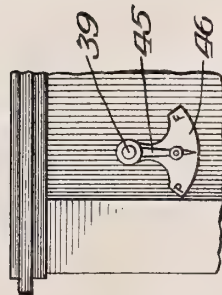
1,198,636.

Patented Sept. 19, 1916.
3 SHEETS—SHEET 1.

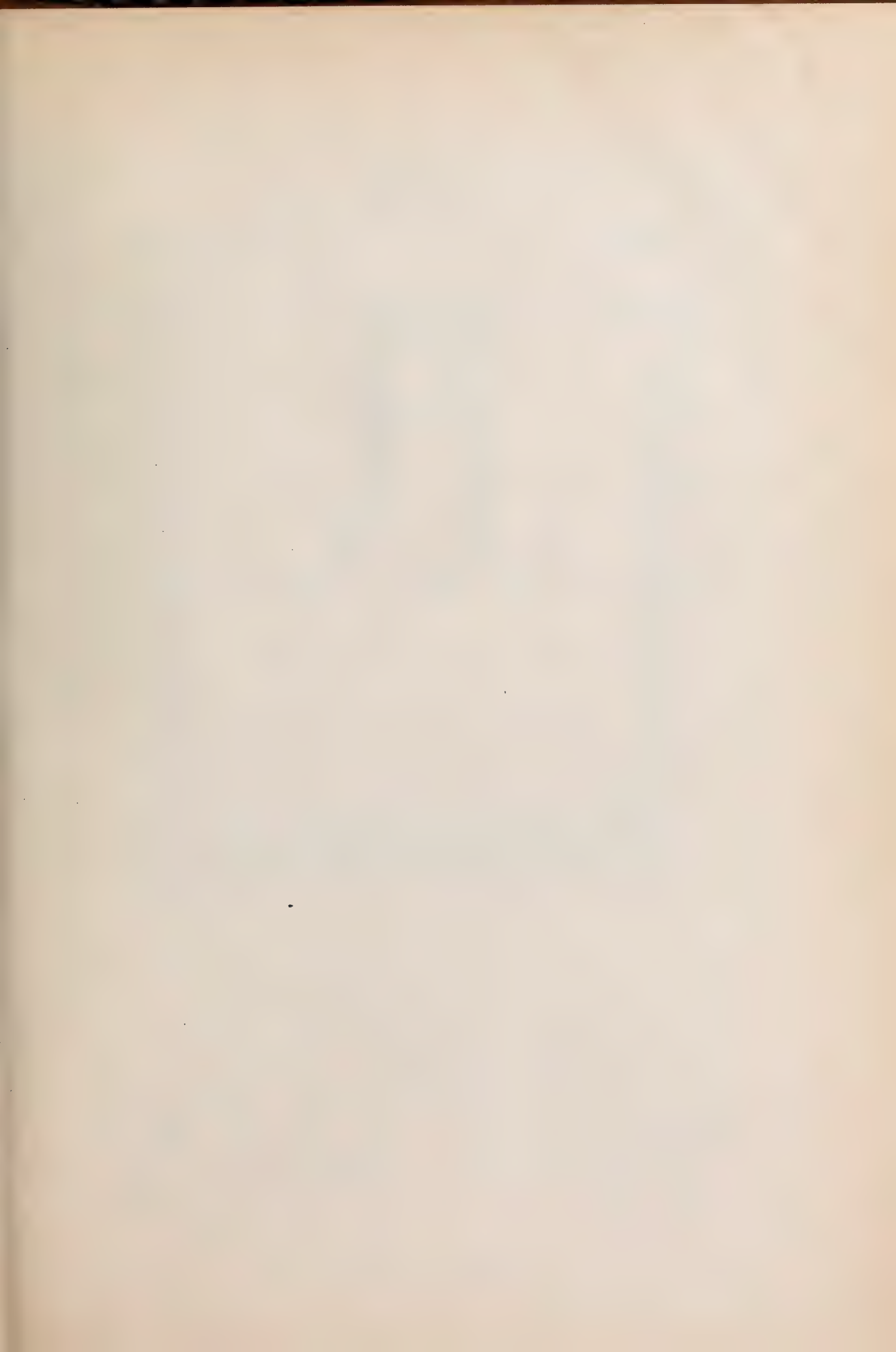


Witnesses:
Ed. C. Brown
A. J. Sawyer.

Fig. 6.



Inventor
Albert A. Huseby
By *Offield, Towle,*
Graves & Offield
Attys

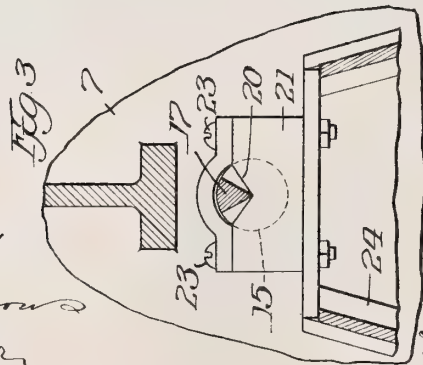
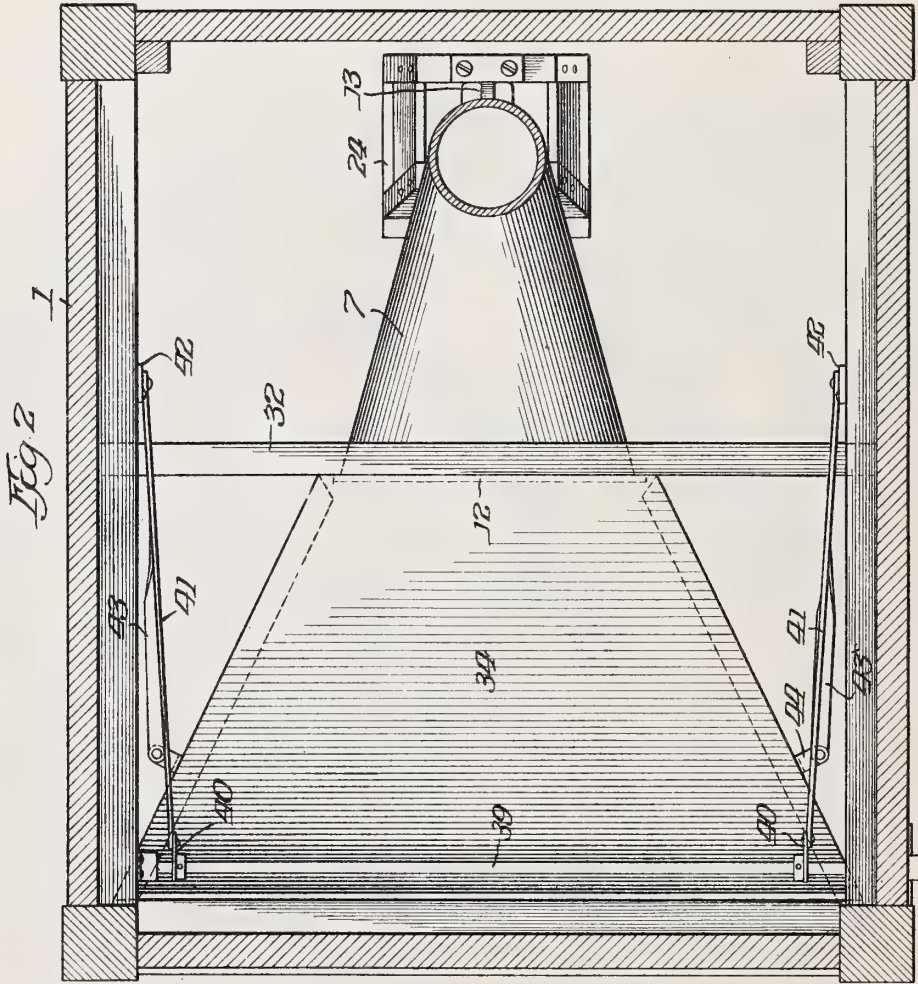


A. A. HUSEBY.
TALKING MACHINE.
APPLICATION FILED DEC. 17, 1915.

1,198,636.

Patented Sept. 19, 1916.

3 SHEETS—SHEET 2.



Witnesses:
Ed. C. Davis
A. J. Sauer

Inventor
Albert A. Huseby,
By Offield, Towle
Graves & Offield
Attys.

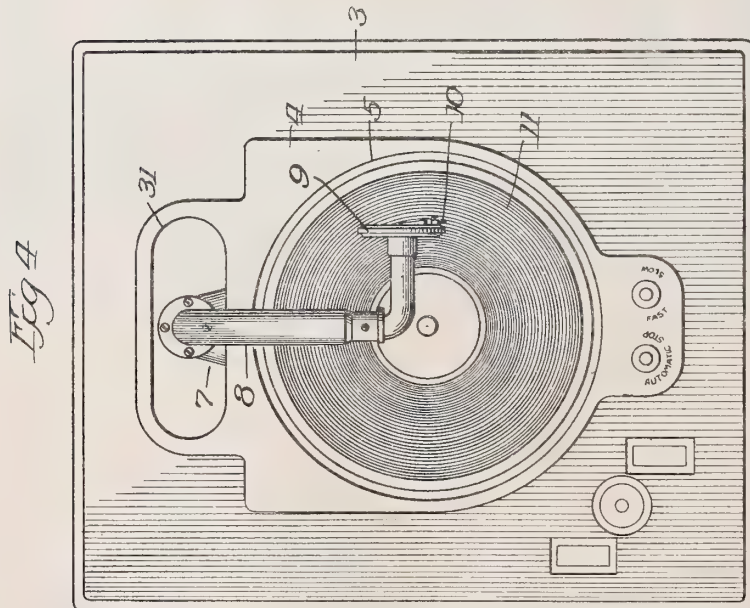
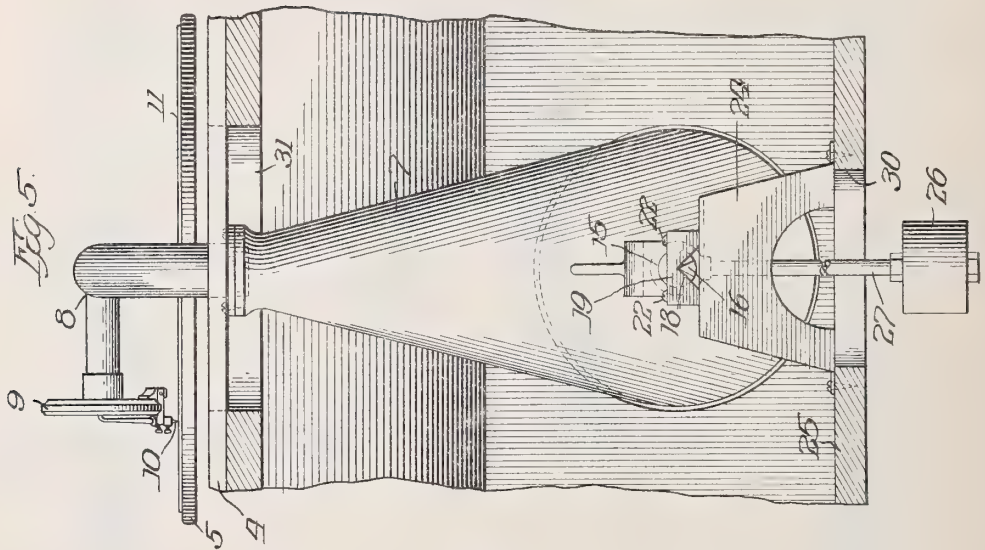


A. A. HUSEBY.
TALKING MACHINE.
APPLICATION FILED DEC. 17, 1915.

1,198,636.

Patented Sept. 19, 1916.

3 SHEETS—SHEET 3.



Witnesses:
Ed. [Signature]
A. J. Sauer.

Inventor
Albert A. Huseby.
By Offield, Towle, Graves & Offield
Attys.

UNITED STATES PATENT OFFICE.

ALBERT A. HUSEBY, OF CHICAGO, ILLINOIS.

TALKING-MACHINE.

1,198,636.

Specification of Letters Patent. Patented Sept. 19, 1916.

Application filed December 17, 1915. Serial No. 67,336.

To all whom it may concern:

Be it known that I, ALBERT A. HUSEBY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

This invention relates to the art of phonographs or talking machines, and has reference more particularly to improvements in the sound conveyers or conduits of such machines.

More specifically, the invention relates to that general type of sound conveyers or conduits that is characterized by a sound tube (consisting of a substantially horizontal laterally swinging tone-arm portion overhanging the turntable and a downwardly and forwardly extending substantially upright portion), and an amplifier that registers and communicates with the delivery end of the sound tube and, as its name implies, serves to amplify and magnify the volume of sound emitted by the sound conveyer.

The principal object of the invention is to simplify the construction and improve the tone-conveying and delivering qualities of sound conveyers of this general type; a more specific object being to provide an improved and simplified construction of and mounting for the sound tube.

Still other objects and advantages of the invention will be apparent to those skilled in the art from a perusal of the following detailed description in connection with the accompanying drawings, wherein—

Figure 1 is a vertical section through the upper portion of the cabinet, the amplifier and the upright section of the sound tube and its bearings, with the turn-table, sound-box and tone-arm section of the sound tube appearing in elevation. Fig. 2 is a horizontal section on the line 2—2 of Fig. 1, omitting the motor. Fig. 3 is a fragmentary section, enlarged, on the line 3—3 of Fig. 1. Fig. 4 is a top plan view with the lid of the cabinet removed. Fig. 5 is a vertical section on the line 5—5 of Fig. 1. Fig. 6 is a detail fragmentary side elevation of the cabinet, showing the amplifier adjusting arm or lever.

In the drawings 1 designates as an entirety the upper portion of the box or cabinet in which the principal parts of the mechanism are housed, and 2 designates the hinged lid or cover. Mounted on the top

wall 3 of the case is a metal plate 4 in which is rotatably mounted the usual turntable 5 driven by a spring motor conventionally illustrated at 6, these parts being of ordinary or usual construction.

7 designates the generally upright portion of the sound tube, to the upper end of which is rigidly connected the horizontally extending portion of the sound tube 8 commonly known as a tone-arm, this latter having flexibly mounted on its free end a sound-box 9 carrying a stylus 10 that engages the spiral groove of the record disk 11. The shank of the sound box to which the sound box proper is rigidly attached has its inner end bent rearwardly and loosely fitted within the forward reduced end of the arm 8 so that the sound box may be swung upwardly about the arm 8 as a center away from the record, thus affording a flexible connection between the sound box and the tone arm. The section 7 of the sound tube, as clearly shown in Fig. 1, is downwardly and forwardly curved from its juncture with the tone-arm and is gradually tapered or flared toward its delivery mouth 12, which latter is in a vertical plane. The sound tube is mounted on a single pivotal support that is located wholly in rear of the sound tube section 7, and the axis of which is parallel with the tone-arm 8. This pivotal mounting of the sound tube as herein shown comprises the following parts: 13 designates a bracket on the rear of the sound tube section 7 in which is removably mounted by means of a set screw 14 a pivot shaft 15. This pivot shaft is formed with a pair of oppositely facing knife-edge trunnions 16 (Fig. 5) and 17 (Fig. 3). The trunnion 16 engages a V-shaped notch 18 in a bearing block 19, and the trunnion 17 engages a V-shaped notch 20 formed in a bearing block 21. The bearing blocks 19 and 21 are secured by bolts 22 and 23, respectively, to a suitable supporting structure 24 that, in turn, rests upon a transverse wall or floor 25 of the cabinet. The sound tube is counterbalanced so as to be practically neutral in all the positions which it assumes under the influence of the record disk by counterbalancing means connected to the pivot shaft 15, said counterbalancing means as herein shown consisting of a pendulum weight 26 mounted on a rod 27 that is keyed at its upper end by a collar 28 and set screw 29 to the shaft 15 and extends through a slot 30 in the floor 25. To accommodate

the lateral swing of that portion of the sound tube which passes through the top wall 3 and plate 4, the registering portions of the latter parts are formed with a slot 31 clearly shown in Fig. 4. By thus mounting the sound tube on a single pivot of the scale bearing type, and accurately counterbalancing same, I produce a construction wherein the side drag of the stylus on the groove of the record is reduced to a minimum, and the freedom of the stylus to respond to the vibratory influence of the lateral undulations of the record groove is enhanced. In the preferred construction the pivotal support of the sound tube is so located relatively to its delivery mouth that the extended axis of said pivotal support passes through the center of the delivery mouth, as a result of which the oscillations of the sound tube produce only a slight oscillating movement of the delivery mouth about its center. 32 designates a transverse partition that lies just behind the vertical plane of the delivery mouth of the sound tube and is apertured to permit the passage of the latter there-through.

Referring now to that element of the sound conveyer or conduit which performs the principal function of an amplifier, this element is made up of a pair of side walls 33, a top wall 34, and a bottom wall 35 which may consist of a portion of the floor member 25. The side walls 33 are hinged at their outer vertical edges to frame members of the cabinet as indicated at 36, and they are formed with downwardly and inwardly inclined upper edges 37 on which rests the top wall 34, this latter being hinged along its outer horizontal edge to a frame member of the cabinet as shown at 38. The side walls 33 are of such length that when swung to a position wherein their free vertical edges are arrested by the transverse partition wall 32, they form substantial continuations of the outwardly flaring side walls of the section 7 of the sound tube, in which position the receiving mouth of the amplifier registers in full with the delivery mouth of the sound tube and receives and transmits all the sound waves emitted by the latter through the open front wall of the cabinet. When, however, the side walls 33 of the amplifier are swung inwardly toward each other, it is obvious that the receiving mouth of the amplifier will be more or less contracted both horizontally and vertically, so that the sound waves from the sound tube will pass only partially therethrough, being partially diverted through the interior of the cabinet, so that the volume of sound emitted will be reduced and the tone effect softened. By swinging the side walls of the amplifier inwardly until their free ends practically meet, substantially the entire volume of sound is diverted into and through

the interior of the cabinet, producing a very soft and muffled tone effect.

Any suitable or convenient mechanism for thus adjusting the movable sides of the amplifier may be employed, the mechanism herein shown for this purpose comprising the following parts: 39 designates a horizontal rock shaft journaled in the upper portion of the cabinet and having keyed thereto a pair of crank-arms 40. These arms are connected by links 41 to depending lever arms 42 that are pivotally suspended from opposite sides of the cabinet, and at their lower ends are connected by links 43 to lugs 44 on the outer sides of the hinged side walls 33 of the amplifier. One end of the rock shaft 39 overhangs one side wall of the cabinet and has secured thereto a manually operable arm or lever 45, preferably overhanging and coöperating with a scale palte 46 carrying piano and forte designations, as indicated in Fig. 6.

From the foregoing description of an instrument embodying the improved features which comprise the present invention, it is believed that the manner in which the several stated objects of the invention are accomplished will be easily comprehended by those familiar with this art. The structural details illustrated and described may, of course, be modified as circumstances may require or the judgment of the builder dictate, without involving any substantial changes or sacrificing any of the benefits and advantages secured. Hence, I reserve any and all such detail changes and modifications as may fully fall within the spirit and purview of the invention as defined in the appended claims.

I claim—

1. In a talking machine, a sound conveyer having an upright portion supported entirely outside the sound passage thereof on a horizontal pivot, a horizontally extending arm portion rigid with said upright portion and extending parallel with the axis of said pivot into operative position over the record disk, a sound box connected to the forward end of said arm portion, and a stationary amplifier communicating with the lower end of said upright portion.

2. In a talking machine, the combination of a stationary amplifier, a sound conveyer having an upright portion terminating at its lower end in a horizontal portion communicating with said amplifier and supported on a horizontal pivot concentric with the joint between said conveyer and said amplifier but disposed entirely outside the sound passage, a horizontally extending arm portion rigid with said upright portion and adapted to oscillate laterally over a record disk, and a sound box flexibly connected to the forward end of said arm portion.

3. In a talking machine, a sound tube

having a horizontally extending arm portion and a downwardly and forwardly curved portion rigid with said arm portion, and a pivotal support for said downwardly and forwardly curved portion located wholly in rear of the latter.

4. In a talking machine, a sound tube having a horizontally extending arm portion and a downwardly and forwardly curved portion rigid with said arm portion, and a pivotal support for said downwardly and forwardly curved portion located wholly in rear of the latter and having its axis parallel with said arm portion.

5. In a talking machine, a sound tube having a horizontally extending arm portion and a downwardly and forwardly curved portion rigid with said arm portion and of gradually increasing diameter from its upper to its lower end, and a pivotal support for said downwardly and forwardly curved portion located wholly in rear of the latter and having its axis parallel with said arm portion.

6. In a talking machine, a sound tube having a horizontally extending arm portion and a downwardly and forwardly curved flaring portion rigid with said arm portion and terminating in a vertical delivery mouth, and a pivotal support for said flaring portion located wholly in rear of the latter, the extended axis of said pivotal support passing through the center of said delivery mouth.

7. In a talking machine, a sound tube having a generally upright portion, and a horizontal support therefor including a pair of oppositely facing knife-edge trunnions and a pair of V-shaped bearings therefor.

8. In a talking machine, a sound tube having a generally upright portion, and a horizontal support therefor comprising a bracket on the rear of said upright portion, a pivot shaft secured in said bracket and formed with a pair of oppositely facing knife-edge trunnions, and a pair of V-shaped bearings for the latter.

9. In a talking machine, a sound tube having a generally upright portion, a horizontal support therefor comprising a bracket on the rear of said upright portion, a pivot shaft secured in said bracket and formed with a pair of oppositely facing knife-edge trunnions, and a pair of V-shaped bearings for the latter, and a depending counterweight secured to said shaft.

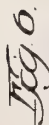
10. In a talking machine, the combination of a sound tube comprising a vertical portion terminating at its lower end in a horizontal portion and its upper end in a horizontal tone-arm, a horizontal pivot disposed concentric with said lower horizontal portion and rearwardly of said vertical portion upon which said tube is supported, and means disposed beneath said pivot for yieldingly maintaining said upright portion in substantially vertical position.

11. In a talking machine, the combination of a sound tube comprising an upright portion provided at each end with rigid horizontally extending portions, means outside the sound passage for pivotally supporting said tube near the lower end thereof, and a counterweight rigidly connected with said tube below said pivot whereby said tube is normally maintained in substantially upright position.

ALBERT A. HUSEBY.

TALKING MACHINE,
#1,198,636-----A.A.Huseby,
Patented-September 19th, 1916.
Filed-December 17th, 1915.

3 SHEETS--SHEET 1.



Witnesses:
 T. C. Doiron
 A. J. Sawyer.

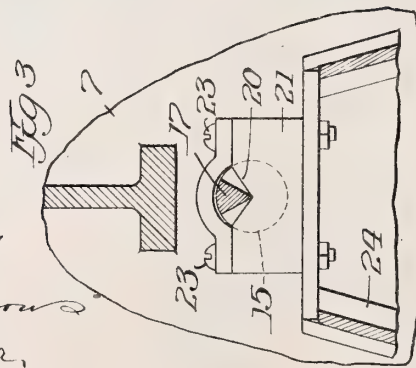
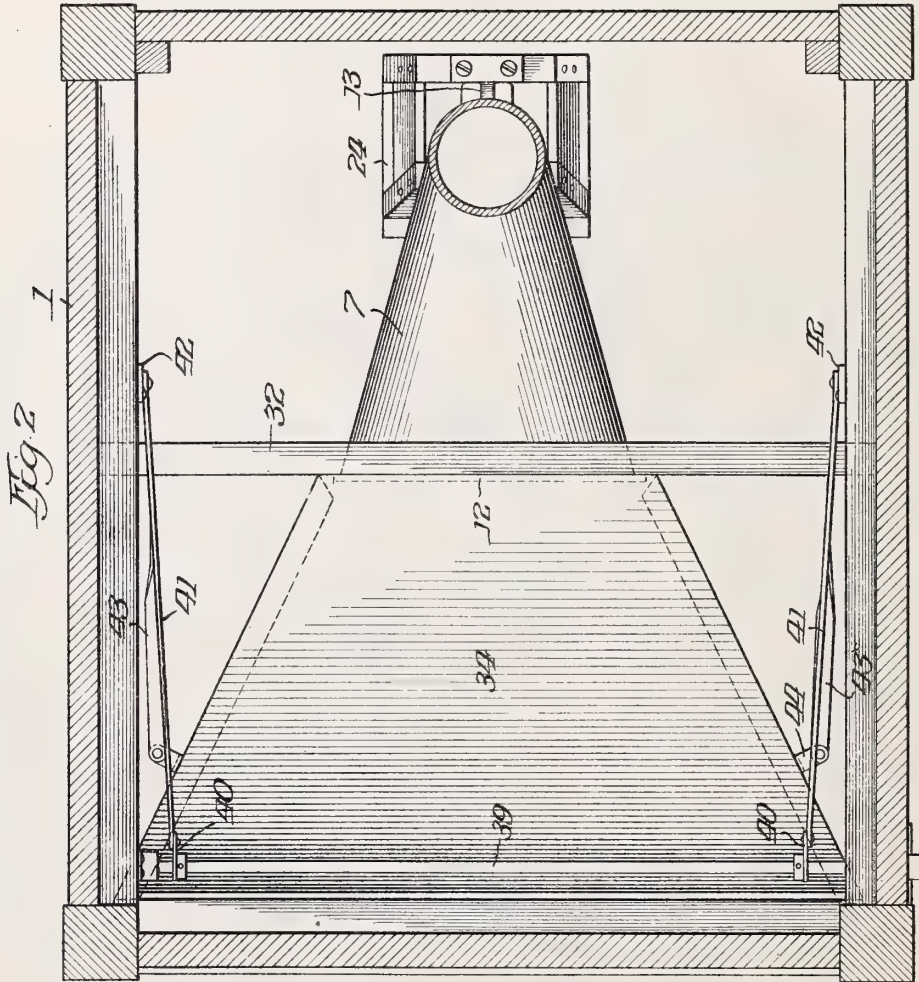
Inventor
Albert A. Huseby
By *Offield, Towle,*
Graves & Offield
Attys



A. A. HUSEBY.
TALKING MACHINE.
APPLICATION FILED DEC. 17, 1915.

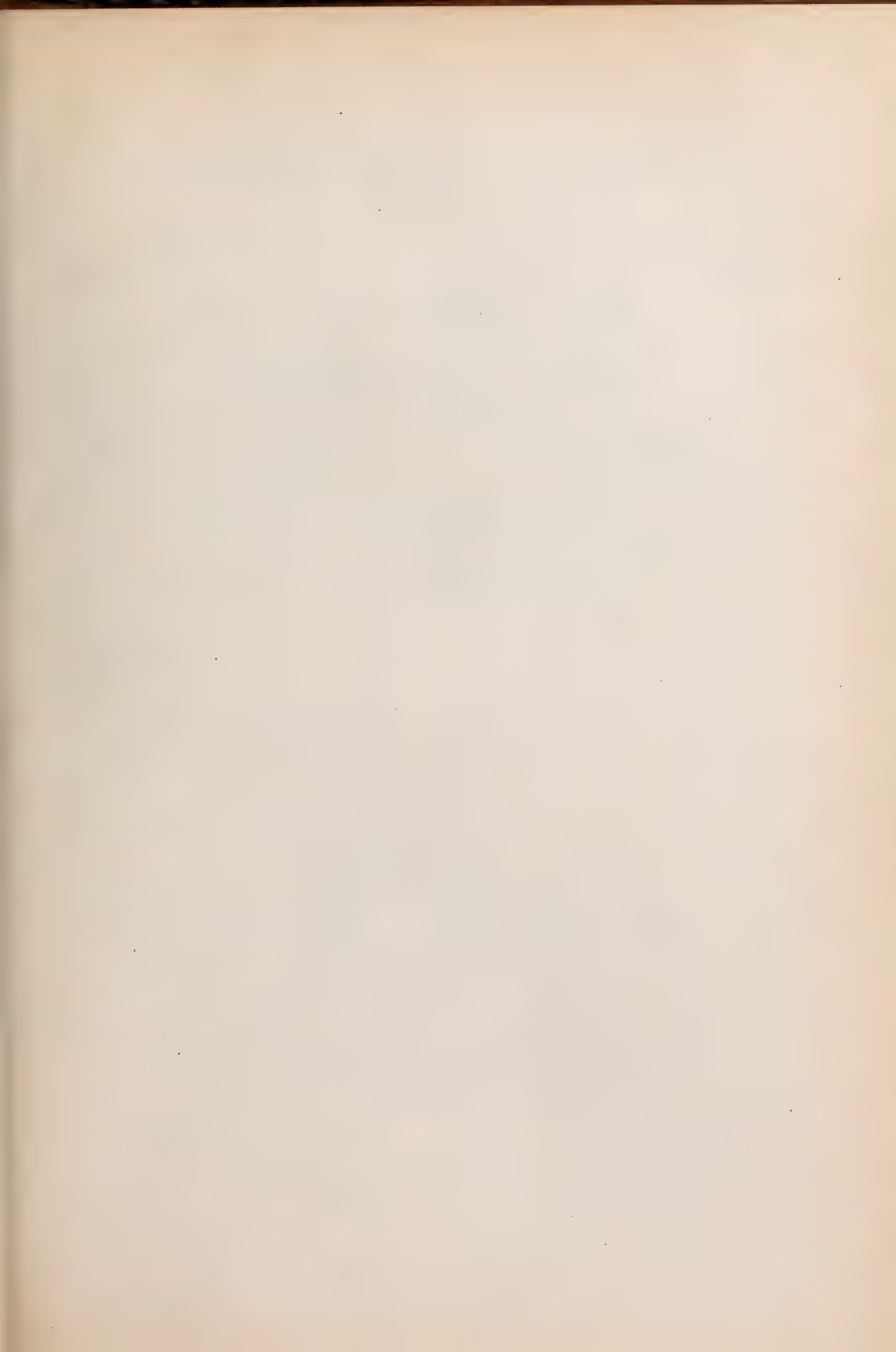
1,198,636.

Patented Sept. 19, 1916.
3 SHEETS—SHEET 2.



Witnesses:
Ed. Collins
A. J. Sauer.

Inventor
Albert A. Huseby,
By Offield, Towle
Graves & Offield
Attys.

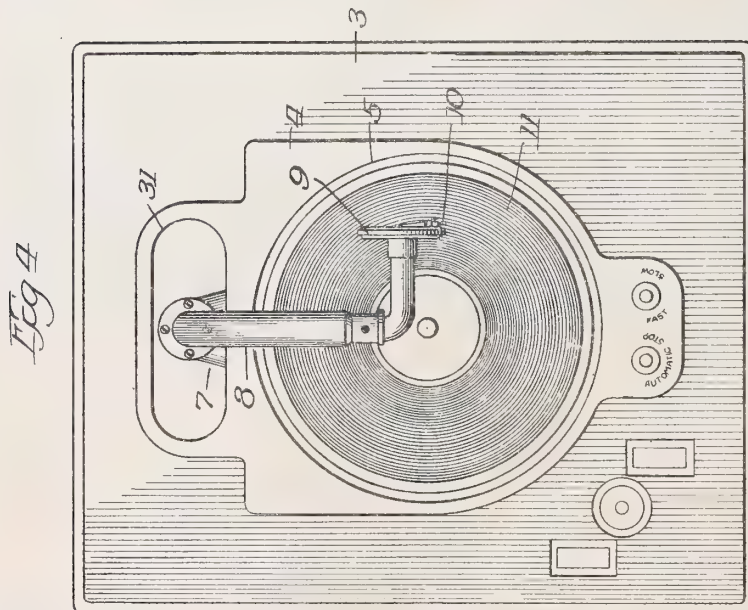
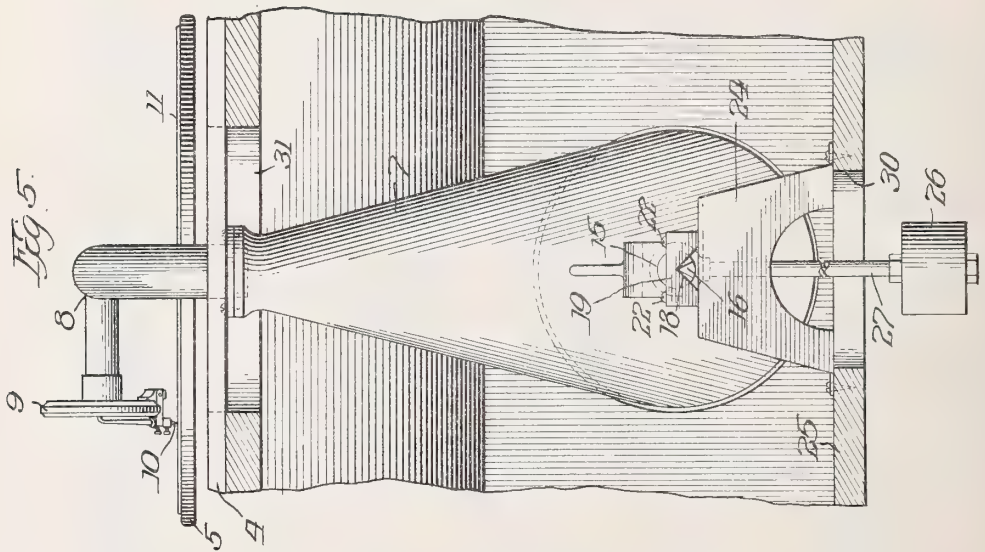


A. A. HUSEBY.
TALKING MACHINE.
APPLICATION FILED DEC. 17, 1915.

1,198,636.

Patented Sept. 19, 1916.

3 SHEETS—SHEET 3.



Witnesses:
Ed. Larson
A. J. Sauer.

Inventor
Albert A. Huseby.
By Offield, Towle, Graves & Offield
Attys.

UNITED STATES PATENT OFFICE.

ALBERT A. HUSEBY, OF CHICAGO, ILLINOIS.

TALKING-MACHINE.

1,198,636.

Specification of Letters Patent. Patented Sept. 19, 1916.

Application filed December 17, 1915. Serial No. 67,336.

To all whom it may concern:

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This invention relates to the art of phonographs or talking machines, and has reference more particularly to improvements in the sound conveyers or conduits of such machines.

More specifically, the invention relates to that general type of sound conveyers or conduits that is characterized by a sound tube (consisting of a substantially horizontal laterally swinging tone-arm portion overhanging the turntable and a downwardly and forwardly extending substantially upright portion), and an amplifier that registers and communicates with the delivery end of the sound tube and, as its name implies, serves to amplify and magnify the volume of sound emitted by the sound conveyer.

The principal object of the invention is to simplify the construction and improve the tone-conveying and delivering qualities of sound conveyers of this general type; a more specific object being to provide an improved and simplified construction of and mounting for the sound tube.

Still other objects and advantages of the invention will be apparent to those skilled in the art from a perusal of the following detailed description in connection with the accompanying drawings, wherein—

Figure 1 is a vertical section through the upper portion of the cabinet, the amplifier and the upright section of the sound tube and its bearings, with the turn-table, sound-box and tone-arm section of the sound tube appearing in elevation. Fig. 2 is a horizontal section on the line 2—2 of Fig. 1, omitting the motor. Fig. 3 is a fragmentary section, enlarged, on the line 3—3 of Fig. 1. Fig. 4 is a top plan view with the lid of the cabinet removed. Fig. 5 is a vertical section on the line 5—5 of Fig. 1. Fig. 6 is a detail fragmentary side elevation of the cabinet, showing the amplifier adjusting arm or lever.

In the drawings 1 designates an entirety the upper portion of the box or cabinet in which the principal parts of the mechanism are housed, and 2 designates the hinged lid or cover. Mounted on the top

wall 3 of the case is a metal plate 4 in which is rotatably mounted the usual turntable 5 driven by a spring motor conventionally illustrated at 6, these parts being of ordinary or usual construction.

7 designates the generally upright portion of the sound tube, to the upper end of which is rigidly connected the horizontally extending portion of the sound tube 8 commonly known as a tone-arm, this latter having flexibly mounted on its free end a sound-box 9 carrying a stylus 10 that engages the spiral groove of the record disk 11. The shank of the sound box to which the sound box proper is rigidly attached has its inner end bent rearwardly and loosely fitted within the forward reduced end of the arm 8 so that the sound box may be swung upwardly about the arm 8 as a center away from the record, thus affording a flexible connection between the sound box and the tone arm. The section 7 of the sound tube, as clearly shown in Fig. 1, is downwardly and forwardly curved from its juncture with the tone-arm and is gradually tapered or flared toward its delivery mouth 12, which latter is in a vertical plane. The sound tube is mounted on a single pivotal support that is located wholly in rear of the sound tube section 7, and the axis of which is parallel with the tone-arm 8. This pivotal mounting of the sound tube as herein shown comprises the following parts: 13 designates a bracket on the rear of the sound tube section 7 in which is removably mounted by means of a set screw 14 a pivot shaft 15. This pivot shaft is formed with a pair of oppositely facing knife-edge trunnions 16 (Fig. 5) and 17 (Fig. 3). The trunnion 16 engages a V-shaped notch 18 in a bearing block 19, and the trunnion 17 engages a V-shaped notch 20 formed in a bearing block 21. The bearing blocks 19 and 21 are secured by bolts 22 and 23, respectively, to a suitable supporting structure 24 that, in turn, rests upon a transverse wall or floor 25 of the cabinet. The sound tube is counterbalanced so as to be practically neutral in all the positions which it assumes under the influence of the record disk by counterbalancing means connected to the pivot shaft 15, said counterbalancing means as herein shown consisting of a pendulum weight 26 mounted on a rod 27 that is keyed at its upper end by a collar 28 and set screw 29 to the shaft 15 and extends through a slot 30 in the floor 25. To accommodate

the lateral swing of that portion of the sound tube which passes through the top wall 3 and plate 4, the registering portions of the latter parts are formed with a slot 31 clearly shown in Fig. 4. By thus mounting the sound tube on a single pivot of the scale bearing type, and accurately counterbalancing same, I produce a construction wherein the side drag of the stylus on the groove of the record is reduced to a minimum, and the freedom of the stylus to respond to the vibratory influence of the lateral undulations of the record groove is enhanced. In the preferred construction the pivotal support of the sound tube is so located relatively to its delivery mouth that the extended axis of said pivotal support passes through the center of the delivery mouth, as a result of which the oscillations of the sound tube produce only a slight oscillating movement of the delivery mouth about its center. 32 designates a transverse partition that lies just behind the vertical plane of the delivery mouth of the sound tube and is apertured to permit the passage of the latter there-through.

Referring now to that element of the sound conveyer or conduit which performs the principal function of an amplifier, this element is made up of a pair of side walls 33, a top wall 34, and a bottom wall 35 which may consist of a portion of the floor member 25. The side walls 33 are hinged at their outer vertical edges to frame members of the cabinet as indicated at 36, and they are formed with downwardly and inwardly inclined upper edges 37 on which rests the top wall 34, this latter being hinged along its outer horizontal edge to a frame member of the cabinet as shown at 38. The side walls 33 are of such length that when swung to a position wherein their free vertical edges are arrested by the transverse partition wall 32, they form substantial continuations of the outwardly flaring side walls of the section 7 of the sound tube, in which position the receiving mouth of the amplifier registers in full with the delivery mouth of the sound tube and receives and transmits all the sound waves emitted by the latter through the open front wall of the cabinet. When, however, the side walls 33 of the amplifier are swung inwardly toward each other, it is obvious that the receiving mouth of the amplifier will be more or less contracted both horizontally and vertically, so that the sound waves from the sound tube will pass only partially therethrough, being partially diverted through the interior of the cabinet, so that the volume of sound emitted will be reduced and the tone effect softened. By swinging the side walls of the amplifier inwardly until their free ends practically meet, substantially the entire volume of sound is diverted into and through

the interior of the cabinet, producing a very soft and muffled tone effect.

Any suitable or convenient mechanism for thus adjusting the movable sides of the amplifier may be employed, the mechanism herein shown for this purpose comprising the following parts: 39 designates a horizontal rock shaft journaled in the upper portion of the cabinet and having keyed thereto a pair of crank-arms 40. These arms are connected by links 41 to depending lever arms 42 that are pivotally suspended from opposite sides of the cabinet, and at their lower ends are connected by links 43 to lugs 44 on the outer sides of the hinged side walls 33 of the amplifier. One end of the rock shaft 39 overhangs one side wall of the cabinet and has secured thereto a manually operable arm or lever 45, preferably overhanging and coöperating with a scale palte 46 carrying piano and forte designations, as indicated in Fig. 6.

From the foregoing description of an instrument embodying the improved features which comprise the present invention, it is believed that the manner in which the several stated objects of the invention are accomplished will be easily comprehended by those familiar with this art. The structural details illustrated and described may, of course, be modified as circumstances may require or the judgment of the builder dictate, without involving any substantial changes or sacrificing any of the benefits and advantages secured. Hence, I reserve any and all such detail changes and modifications as may fully fall within the spirit and purview of the invention as defined in the appended claims.

I claim—

1. In a talking machine, a sound conveyer having an upright portion supported entirely outside the sound passage thereof on a horizontal pivot, a horizontally extending arm portion rigid with said upright portion and extending parallel with the axis of said pivot into operative position over the record disk, a sound box connected to the forward end of said arm portion, and a stationary amplifier communicating with the lower end of said upright portion.

2. In a talking machine, the combination of a stationary amplifier, a sound conveyer having an upright portion terminating at its lower end in a horizontal portion communicating with said amplifier and supported on a horizontal pivot concentric with the joint between said conveyer and said amplifier but disposed entirely outside the sound passage, a horizontally extending arm portion rigid with said upright portion and adapted to oscillate laterally over a record disk, and a sound box flexibly connected to the forward end of said arm portion.

3. In a talking machine, a sound tube

having a horizontally extending arm portion and a downwardly and forwardly curved portion rigid with said arm portion, and a pivotal support for said downwardly and forwardly curved portion located wholly in rear of the latter.

4. In a talking machine, a sound tube having a horizontally extending arm portion and a downwardly and forwardly curved portion rigid with said arm portion, and a pivotal support for said downwardly and forwardly curved portion located wholly in rear of the latter and having its axis parallel with said arm portion.

5. In a talking machine, a sound tube having a horizontally extending arm portion and a downwardly and forwardly curved portion rigid with said arm portion and of gradually increasing diameter from its upper to its lower end, and a pivotal support for said downwardly and forwardly curved portion located wholly in rear of the latter and having its axis parallel with said arm portion.

6. In a talking machine, a sound tube having a horizontally extending arm portion and a downwardly and forwardly curved flaring portion rigid with said arm portion and terminating in a vertical delivery mouth, and a pivotal support for said flaring portion located wholly in rear of the latter, the extended axis of said pivotal support passing through the center of said delivery mouth.

7. In a talking machine, a sound tube having a generally upright portion, and a horizontal support therefor including a pair of oppositely facing knife-edge trunnions and a pair of V-shaped bearings therefor.

8. In a talking machine, a sound tube having a generally upright portion, and a horizontal support therefor comprising a bracket on the rear of said upright portion, a pivot shaft secured in said bracket and formed with a pair of oppositely facing knife-edge trunnions, and a pair of V-shaped bearings for the latter.

9. In a talking machine, a sound tube having a generally upright portion, a horizontal support therefor comprising a bracket on the rear of said upright portion, a pivot shaft secured in said bracket and formed with a pair of oppositely facing knife-edge trunnions, and a pair of V-shaped bearings for the latter, and a depending counterweight secured to said shaft.

10. In a talking machine, the combination of a sound tube comprising a vertical portion terminating at its lower end in a horizontal portion and its upper end in a horizontal tone-arm, a horizontal pivot disposed concentric with said lower horizontal portion and rearwardly of said vertical portion upon which said tube is supported, and means disposed beneath said pivot for yieldingly maintaining said upright portion in substantially vertical position.

11. In a talking machine, the combination of a sound tube comprising an upright portion provided at each end with rigid horizontally extending portions, means outside the sound passage for pivotally supporting said tube near the lower end thereof, and a counterweight rigidly connected with said tube below said pivot whereby said tube is normally maintained in substantially upright position.

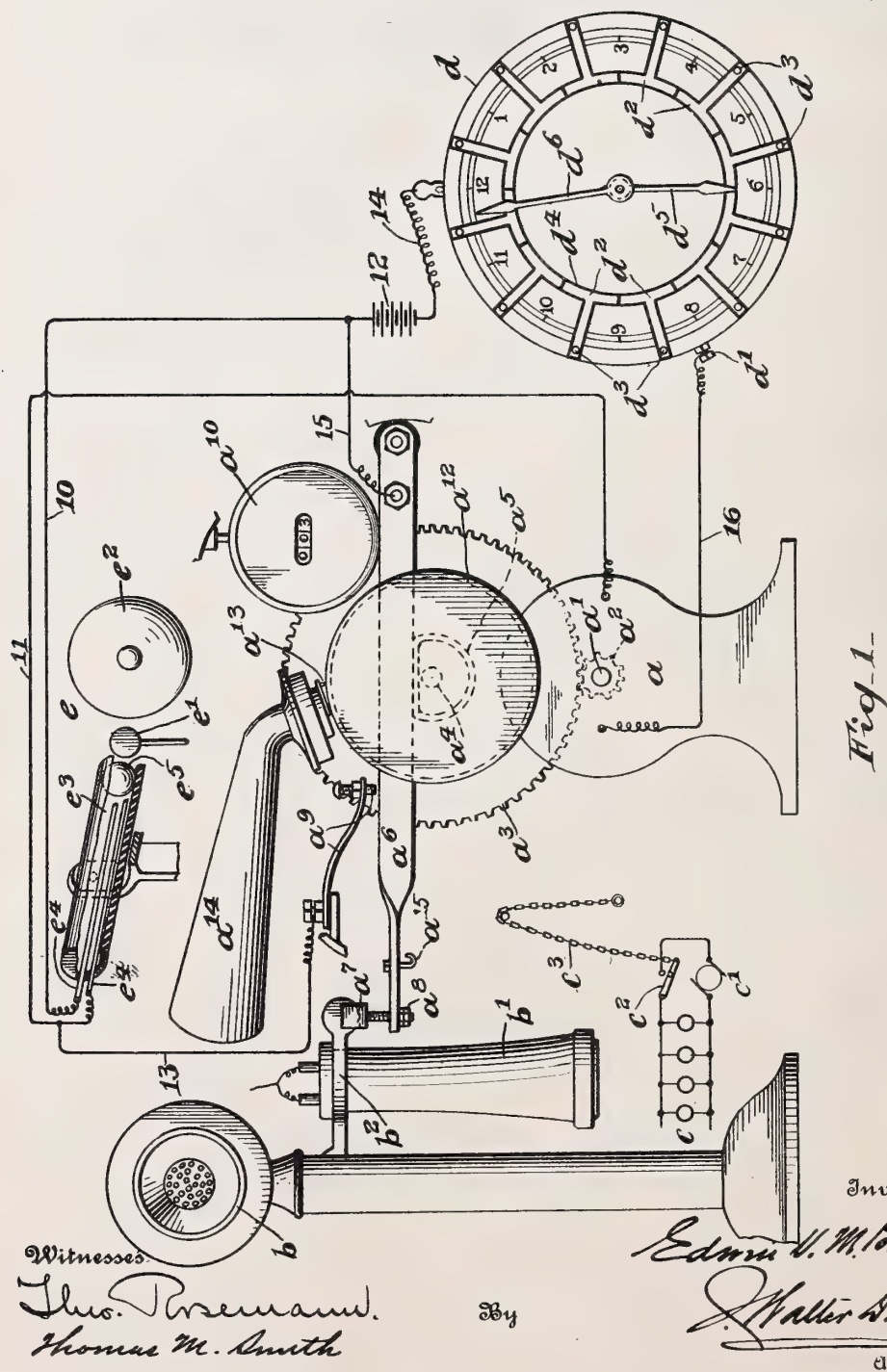
ALBERT A. HUSEBY.

MOTOR TO CONTROL AUTOMATICALLY A SUBSCRIBER'S TELEPHONE FOR VARIED SERVICE,
#1,198,695-----E. V. M. Brennan,
Patented-September 19th, 1916.
Filed-October 5th, 1915.

MOTOR TO CONTROL AUTOMATICALLY, A SUBSCRIBER'S TELEPHONE FOR VARIED SERVICE.
APPLICATION FILED OCT. 5, 1915.

Patented Sept. 19, 1916.

3 SHEETS—SHEET 1.





MOTOR TO CONTROL AUTOMATICALLY A SUBSCRIBER'S TELEPHONE FOR VARIED SERVICE.
APPLICATION FILED OCT. 5, 1915.

Patented Sept. 19, 1916.

3 SHEETS—SHEET 2.



Inventor

Inventor
Edwin H. M. Brumm.

Walter Douglas

Attorney

E. V. M. BRENNAN.
 MOTOR TO CONTROL AUTOMATICALLY A SUBSCRIBER'S TELEPHONE FOR VARIED SERVICE.
 APPLICATION FILED OCT. 5, 1915.

1,198,695.

Patented Sept. 19, 1916.
 3 SHEETS—SHEET 3.

Fig. 3.

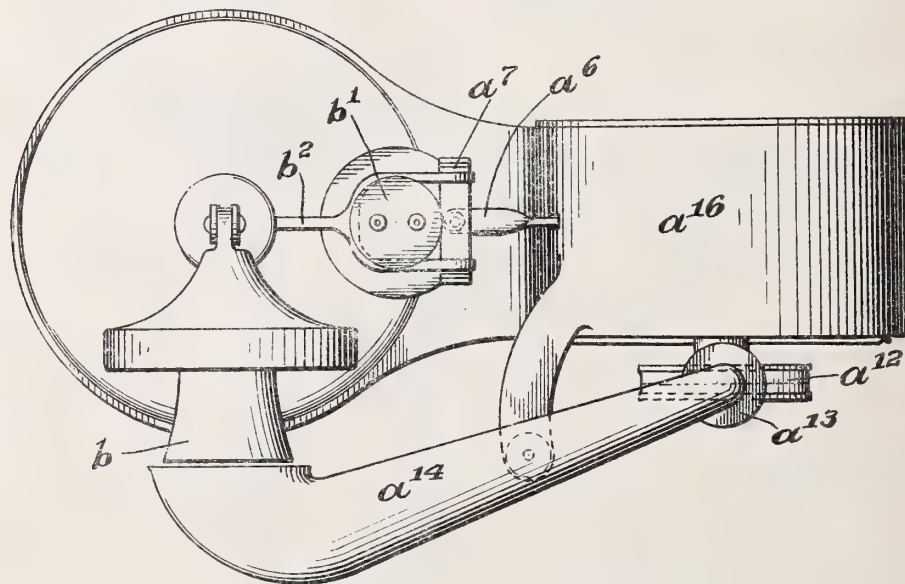
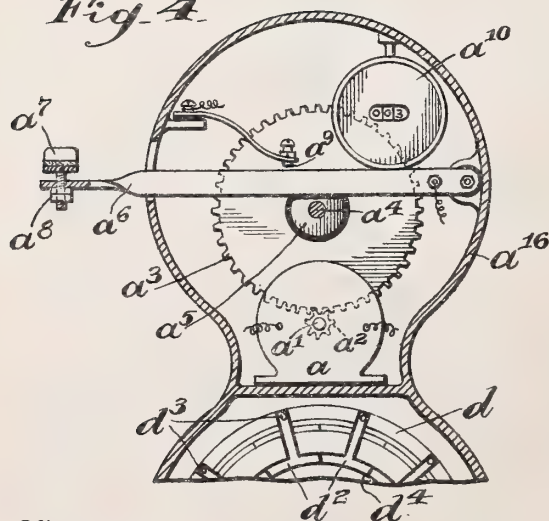


Fig. 4.

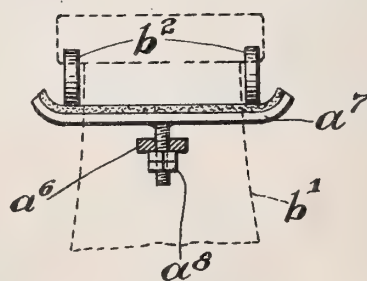


Witnesses

Thos. Brennan,
 Thomas M. Smith

By

Fig. 5.



Inventor
 Edwin V. M. Brennan,
 J. Walter Simpson.

Attorney

UNITED STATES PATENT OFFICE.

EDWIN V. M. BRENNAN, OF PHILADELPHIA, PENNSYLVANIA.

MOTOR TO CONTROL AUTOMATICALLY A SUBSCRIBER'S TELEPHONE FOR VARIED SERVICE.

1,198,695.

Specification of Letters Patent. Patented Sept. 19, 1916.

Application filed October 5, 1915. Serial No. 54,138.

To all whom it may concern:

Be it known that I, EDWIN V. M. BRENNAN, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Motors to Control Automatically a Subscriber's Telephone for Varied Service, of which the following is a specification.

My invention relates to a motor to establish and control automatically a telephone circuit from a subscriber's telephone through a central station with another telephone for inter-communication, recording a call, to light and extinguish lights at distant points by telephone connection, to register predetermined calls of different subscribers' telephones on the operated telephone, as well as phonographically calls through the subscriber's telephone actuated and controlled by the motor set in action by a rolling contact actuated by the clapper of a central station circuit bell to establish the circuit of the subscriber's telephone through the central station with the telephone in which required connection is desired.

My invention in such connection relates to the general structural arrangement of the motor and accessories adapted to be brought into relation therewith and operated thereby and to the automatic operation of the motor for bringing the subscriber's instrument into and out of circuit through the central station with the particular subscriber's telephone desired for certain or all of the defined purposes.

The nature, scope and characteristic features of my present invention will be more fully understood from the following description taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1, is a diagrammatic view of a motor and accessories affected thereby, the motor being shown in application to the receiver arm of a subscriber's telephone and in a position for action and a rolling contact actuated by the clapper of the bell of a central station circuit to set in action the motor to lift thereby the receiver arm so as to establish communication with another telephone through the central station exchange; this view embodying general and specific features of my said invention. Fig.

2, is a front elevational view of the motor, showing the same in engagement with the receiver-arm of the subscriber's telephone. Fig. 3, is a plan view of Fig. 2. Fig. 4, is a vertical sectional view through the casing of the motor, showing the operating mechanism and registering device operated by the motor and a timing device shown in broken section. Fig. 5, is a detail view of an adjustable cushioned saddle adapted to be brought up against the receiver-arm of the telephone in lifting the same by the action of the motor. Fig. 6, is a view partly in section and partly in front elevation, a modified form, in this instance a double rolling contact arranged to be actuated either way by the clapper of a central station bell; and Fig. 7, is a transverse section on the line x, x , of Fig. 6, showing a means to angularly adjust the casing as the movable contacts shift with respect to each other and as operated by the vibrations of the bell clapper, for example in the manner as shown in Fig. 6.

Referring to the drawings a , represents the motor mounted in a casing a^{10} . The shaft a^1 , of the motor carries a pinion a^2 , meshing with a large gear-wheel a^3 . This gear-wheel carried on a cross-shaft a^4 , has fixed thereto a cam a^5 , for controlling the up and down movements of a long lever-arm a^6 , arranged lengthwise of the casing a^{10} , and pivoted at one end in the said casing thereto and carrying at the free end thereof and beyond the said casing, a padded saddle a^7 , adjustably supported in required position by means of a tightening nut a^8 . In the casing a^{10} , as shown in Fig. 4, is arranged an adjustable contact a^9 , so that by the lifting of the said lever-arm a^6 , in a manner to be hereinafter more fully explained positive contact is established with said arm. In the casing a^{10} , is also mounted any well known type of registering device a^{10} , the movement of the lever-arm a^6 , shifting the numerals of the same, so that any call of the telephone may thus at once be observed through the opening in the face of the said device at the subscriber's telephone. Mounted on the shaft a^4 , is a phonograph disk a^{12} , with a reproducer a^{13} , and a horn a^{14} , which may be brought into the path of the transmitter b of the telephone, for example, as clearly shown in Figs. 2 and 3. This telephone is provided with a

receiver b^1 , and forked arm b^2 , engaging the same which is adapted to be brought into contact with the cushioned saddle a^7 , for placing the receiver thereby in a position to be automatically lifted by the motor a , in a manner to be hereinafter more fully explained.

c , is a lighting system, showing the generator c^1 , and a switch c^2 , with a chain c^3 , connected with one terminal of said switch, for operating the same. The chain c^3 , is adapted to engage a hook a^{15} , of the lever-arm a^6 , operated by the motor a , as clearly shown in Fig. 1.

The foregoing is one of the applications in which the motor a , can be employed in conjunction with a telephone system, to control automatically the making and breaking of connection between subscribers' telephones through a central station exchange, not shown, and in which also the lighting and the extinguishing of lamps of a plant can be controlled thereby at predetermined times by the use of the timing device d , controlled through the said motor a , by the operation of a subscriber's telephone in circuit with said motor as will be hereinafter more fully explained.

Adjacent to the bell-box e , in the circuit of the central station exchange, not shown, is provided a clapper e^1 , for tapping the bell or bells e^2 thereof, as clearly shown in Figs. 1 and 6. In close proximity to the clapper e^1 , is arranged pivotally supported, a tube e^3 , Fig. 1, with internal track-ways e^4 , e^4 , suitably insulated from the said tube for the reception of a ball or balls e^5 , as clearly shown in Figs. 1 and 6. The ball normally rests in one extremity of the tube, beyond the track-ways provided therein. The vibration of the clapper e^1 , drives the ball e^5 from its normal position onto the trackway e^4 , e^4 , to thereby establish a circuit by the lines 10, 11, from the source of energy 12 and line 13, to the positive contact a^9 and by a branch line 14 to the timing device d , and by the line 15, to the lever-arm a^6 , and by the line 11 to the motor a , and by the line 16, to the binding post d^1 , of the said timing device d . The timing device d , consists of a series of 12 separate or distinct sectional insulated contacts d^2 , as clearly illustrated in Fig. 1. This device is provided with plugs d^3 in the series of sections d^2 . This timing device d , is provided with hands d^5 , d^6 , operatively controlled by a suitable clock-work mechanism, not shown. The arrangement of this timing device provided with the plugs d^3 , is such as that at predetermined different hours the subscriber's telephone can be actuated to establish automatically through the central station exchange communication with some other subscriber's telephone or telephones or failure to establish such connection and of that

fact being known by the exposure of a certain numeral in the opening of said registering device a^{10} .

In establishing a circuit through the telephone, the exchange bell call is actuated to cause the clapper e^1 and it in turn to drive the ball e^5 , onto the trackways e^4 , e^4 , of the adjustable tube e^3 , so as thereby to establish the circuit 10 and 11, and branches thereof, to and through the motor a , to cause it to be set in action and in turn the longitudinal lever arm a^6 , to be brought into engagement with the contact a^9 , when the ball e^5 by this time, will by gravity fall back into the extreme end of the tube e^3 , for example, into the position as shown in Fig. 1. The contact being established as just described, the motor continues to operate until the telephone receiver forked arm is lifted to establish intercommunication of such telephone through the exchange with any other particular subscriber's telephone desired, or the fact it cannot be had by reason of being busy or not answering, which will be registered on the device a^{10} , through lifting of the said lever-arm a^6 . It can be so arranged as shown, so that the phonograph by having recorded the call, will when the telephone is again operated call this particular number of the telephone that was desired or that could not be had and the fact given through the transmitter of said subscriber's telephone. By placing the chain c^3 , in engagement with the hook a^{15} of the lever-arm a^6 , and plugging in on the timing device d , the particular hour to light or extinguish a lamp or lamps of a distant lighting plant, in the automatic operation of the telephone receiver, by the motor a , can be readily accomplished. The plug being arranged in the branch circuit 14, from the source of energy for this purpose, as will be readily understood from Fig. 1.

The important feature of my said invention is to automatically connect up the receiver-arm of a telephone with a motor to enable when the office force is absent to permit a person to call that telephone and to have the call register or to phonographically record the same so that in again operating the telephone the call will be then given to the operator or through the registering device, the call noticeable by the change of numeral exposed through the face of the said device a^{10} . It can also be employed equally well for the switching in of the lamps of a distant lighting plant by the action of the said timing device operating in conjunction with the said motor to raise the receiver-arm so as to establish automatically the circuit at some predetermined hour or moment of time. Each subscriber's telephone it is to be understood must be provided with such a motor for the defined purpose.

Having thus described the nature and objects of my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a motor of the character described, 5
a rolling contact for rendering active said motor, a telephone-receiver, a lever-arm adapted to adjustably engage said telephone receiver and operated by said motor to establish a circuit from a source of energy 10
and a positive contact in a branch of the circuit of said rolling contact, substantially as and for the purposes described.

2. In a motor of the character described, 15
a rolling contact for rendering active said motor, a telephone-receiver, a lever-arm adapted to adjustably engage said receiver, a bell provided with a clapper for actuating said rolling contact and which bell is included in a branch of the line exchange circuit, an adjustable contact arranged to engage said lever-arm and operated by said motor to establish the circuit therethrough 20
and a timing device in the branch circuit in which said rolling contact and said motor are included, substantially as and for the purposes described.

3. In a motor of the character described, 25
a bell provided with a clapper in an exchange circuit, a contact actuated by said clapper to operate the motor to cause the circuit from a telephone to be established through the exchange circuit with another telephone, a registering device and means to operate the same, a phonograph and a timing device, included in a branch of said 30
motor circuit, substantially as and for the purposes described.

4. In a motor of the character described, 35
a rolling contact, a device included in the exchange bell circuit for actuating said rolling contact, a contact in a branch circuit from said rolling contact with the motor from a source of energy, a telephone receiver and a lever-arm operating to lift said receiver to

establish the line circuit with another tele- 45
phone and a registering device actuated by said lever-arm by means of said motor, substantially as and for the purposes described.

5. In a motor of the character described, 50
a motor, a rolling contact adapted to be shifted and in traveling establishing the circuit through said motor, a telephone receiver, said motor providing for the lifting automatically of said receiver and a registering device actuated by the means arranged to lift 55
said receiver, substantially as and for the purposes described.

6. A motor, included in a circuit with a timing device having a series of sections insulated from each other, plugs arranged to 60
be separably inserted in said device, a telephone receiver-arm, a lever-arm in said motor circuit carrying an adjustable saddle for engaging said telephone receiver-arm and a contact adapted to be engaged by said lever- 65
arm, substantially as and for the purposes described.

7. A motor included in a circuit with a timing device having a series of sections insulated from each other, plugs adapted to be 70
separably inserted in said sections, a telephone receiver-arm, a lever-arm in said motor circuit carrying an adjustable saddle for engaging said telephone receiver-arm, a contact arranged to engage said lever-arm, 75
a timing device and a lighting or similar means arranged to engage said lever-arm and to be actuated thereby, in conjunction with said timing device, included in said motor-circuit, substantially as and for the 80
purposes described.

In witness whereof, I have hereunto set my signature in the presence of the two subscribing witnesses.

EDWIN V. M. BRENNAN.

Witnesses:

THOMAS M. SMITH,
THEODORE ROSEMAN.

<p>1. The first part of the report deals with the general situation of the country and the progress of the work during the year.</p> <p>2. The second part contains a detailed account of the work done in each of the various departments.</p> <p>3. The third part gives a summary of the results of the work and a statement of the progress made towards the completion of the various projects.</p> <p>4. The fourth part contains a list of the names of the persons who have been employed during the year and a statement of the salaries paid to them.</p> <p>5. The fifth part contains a list of the names of the persons who have been employed during the year and a statement of the salaries paid to them.</p> <p>6. The sixth part contains a list of the names of the persons who have been employed during the year and a statement of the salaries paid to them.</p> <p>7. The seventh part contains a list of the names of the persons who have been employed during the year and a statement of the salaries paid to them.</p> <p>8. The eighth part contains a list of the names of the persons who have been employed during the year and a statement of the salaries paid to them.</p> <p>9. The ninth part contains a list of the names of the persons who have been employed during the year and a statement of the salaries paid to them.</p> <p>10. The tenth part contains a list of the names of the persons who have been employed during the year and a statement of the salaries paid to them.</p>	<p>1. The first part of the report deals with the general situation of the country and the progress of the work during the year.</p> <p>2. The second part contains a detailed account of the work done in each of the various departments.</p> <p>3. The third part gives a summary of the results of the work and a statement of the progress made towards the completion of the various projects.</p> <p>4. The fourth part contains a list of the names of the persons who have been employed during the year and a statement of the salaries paid to them.</p> <p>5. The fifth part contains a list of the names of the persons who have been employed during the year and a statement of the salaries paid to them.</p> <p>6. The sixth part contains a list of the names of the persons who have been employed during the year and a statement of the salaries paid to them.</p> <p>7. The seventh part contains a list of the names of the persons who have been employed during the year and a statement of the salaries paid to them.</p> <p>8. The eighth part contains a list of the names of the persons who have been employed during the year and a statement of the salaries paid to them.</p> <p>9. The ninth part contains a list of the names of the persons who have been employed during the year and a statement of the salaries paid to them.</p> <p>10. The tenth part contains a list of the names of the persons who have been employed during the year and a statement of the salaries paid to them.</p>
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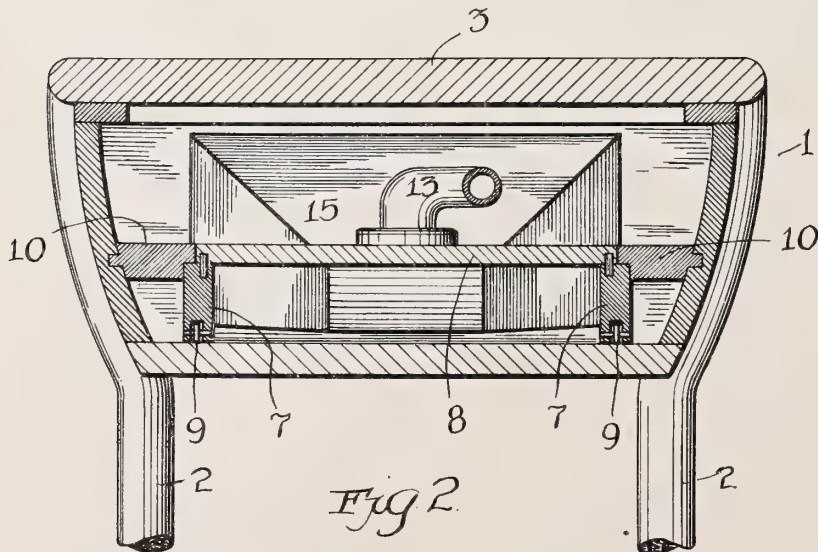
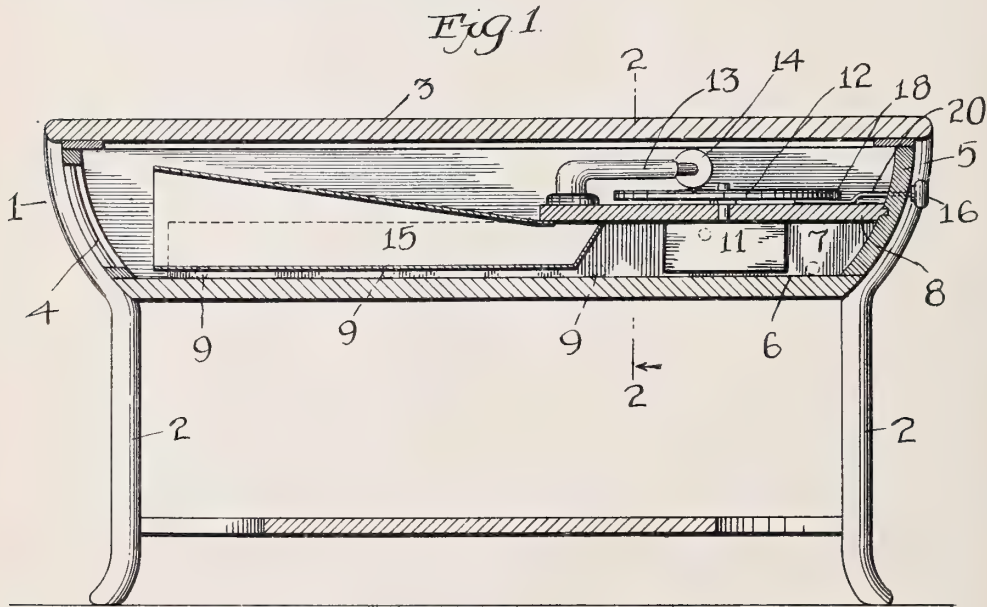
CABINETED PHONOGRAPH,
#1,198,782-----N. Shafran,
Patented-September 19th, 1916.
Filed-February 15th, 1916.

N. SHAFRAN.
CABINETED PHONOGRAPH.
APPLICATION FILED FEB. 15, 1916.

1,198,782.

Patented Sept. 19, 1916.

2 SHEETS—SHEET 1.



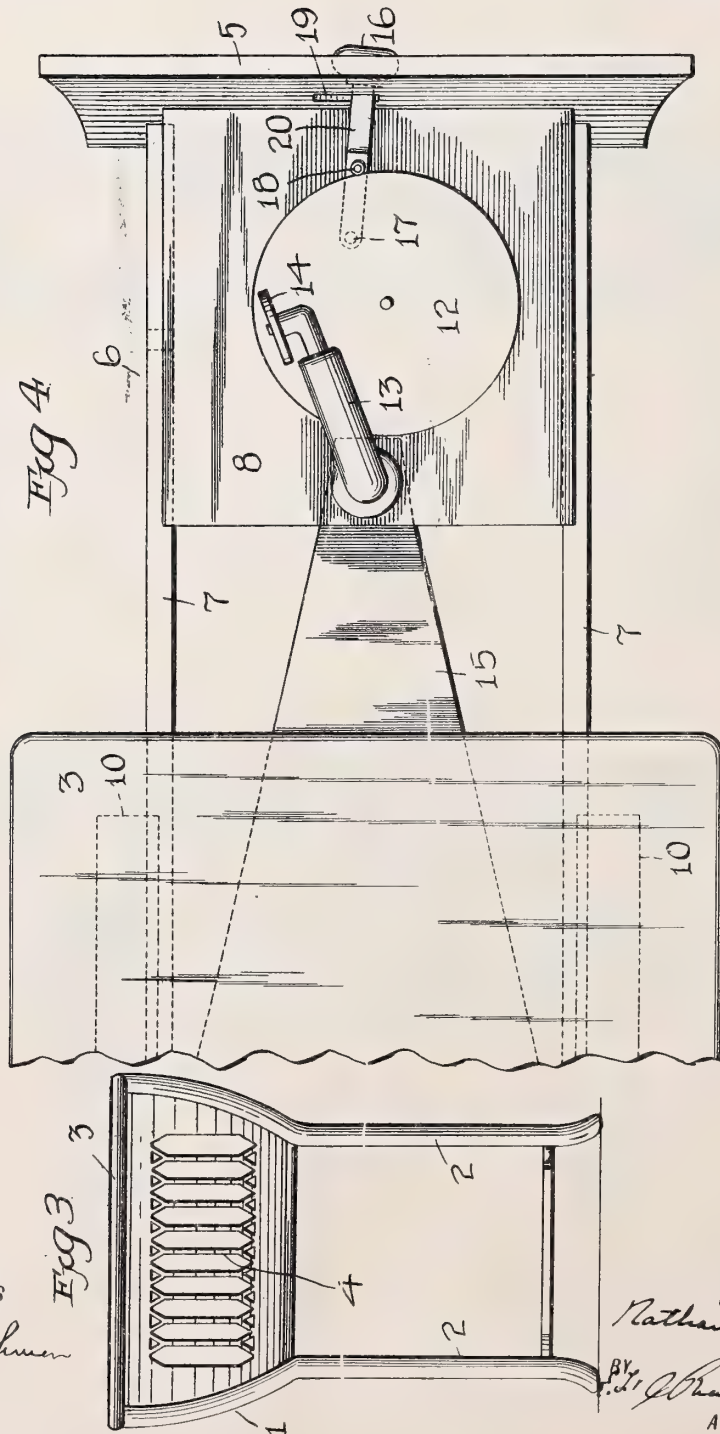
WITNESS
Geo. A. Linn

INVENTOR
Nathan Shafan
BY *E. J. B. Rounding*
ATTORNEYS

N. SHAFRAN.
CABINETED PHONOGRAPH.
APPLICATION FILED FEB. 15, 1916.

1,198,782.

Patented Sept. 19, 1916.
2 SHEETS—SHEET 2.



WITNESS
Chas. A. Johnson

INVENTOR
Nathan Shafraan
BY *J. J. Chaudhury*
ATTORNEYS

UNITED STATES PATENT OFFICE.

NATHAN SHAFRAN, OF MONTICELLO, NEW YORK, ASSIGNOR TO E. HAMBURGER & CO.,
OF BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK.

CABINETED PHONOGRAPH.

1,198,782.

Specification of Letters Patent.

Patented Sept. 19, 1916.

Application filed February 15, 1916. Serial No. 78,361.

To all whom it may concern:

Be it known that I, NATHAN SHAFRAN, a citizen of the United States, residing at Monticello, in the county of Sullivan and State of New York, have invented certain new and useful Improvements in Cabineted Phonographs, of which the following is a specification.

The invention is an improvement in cabinet constructions for phonographs, suitable especially for embodiment in table form, the phonograph being accessible without disturbing the top. Phonograph mountings wherein this is possible are known, but they have involved the use of swinging phonograph supports, and their horns have been built in stationarily as a part of the cabinet, as is the general practice in cabinet machines. In such constructions the manner of mounting the phonograph support has rendered it ill adapted to sustain the considerable strain which is imposed upon it by the weight of the motor and other parts when the support is drawn out from the casing, and, furthermore, because of the swinging mounting, it has been necessary to sacrifice the best acoustic results by an awkward arrangement of the horn, and to provide pivotal joints between the horn and the phonograph support. The purpose of this invention is to overcome these difficulties and disadvantages and to provide a construction which will be of great strength and rigidity, convenient in use, and wherein the parts will be advantageously disposed with regard both to the character of the space available and the sounding qualities of the machine.

In the accompanying drawings illustrating the preferred embodiment of the invention: Figure 1 is a longitudinal vertical section; Fig. 2 is a vertical transverse section on the line 2—2 of Fig. 1; Fig. 3 is an end elevation; and Fig. 4 is a fragmentary plan, the carriage being shown pulled out somewhat farther than is necessary for the purpose of inserting or removing a record.

The phonograph and its horn are housed in a horizontally elongated casing 1, forming the upper part of a table, whereof 2 are the supports. The top 3 of the table, which forms the top of the casing, is fixed, not requiring to be moved in order to obtain access to the phonograph mechanism. The forward end of the casing is substantially

open, to constitute a sound exit, and may be occupied by a lattice screen 4. The opposite end is closed by a movable wall 5. United with this wall is a phonograph carriage 6, which preferably carries both the phonograph and the horn, and is drawn straight outward when it is desired to insert or remove a record.

In the preferred embodiment of the invention illustrated the carriage comprises side guide rails 7, united to the movable wall 5, and a motor board 8 mounted upon and further uniting the rails at their rear portions. The said rails are shown supported on the bottom wall of the casing, whereon they may travel easily by virtue of the provision of rollers 9, and further guided by ledges 10, which project inward from the sides of the casing and include guide portions cooperating with the rails at both top and sides.

The phonograph mechanism, of ordinary construction, includes a motor 11 secured to and beneath the motor board, a turntable or record support 12 and a swinging reproducer arm 13 carrying a sound box 14. The side rails 7 project for a substantial distance beyond the motor board and as shown are extended almost to the sound exit 4. The horn 15 extends straight forward in the space between the side rails, with its forward end in proximity to the sound exit, as shown in Fig. 1, and is preferably united rigidly at its rear end to the underside of the forward portion of the motor board, in communication with the hollow reproducer arm, the horn thus being movable with the carriage. The bottom wall of the horn is shown substantially horizontal, while its upper wall inclines upward above the plane of the motor board and its side walls flare outward, at approximately equal angles, to or beyond the forward portions of the side rails, the horn as thus constructed being adapted with relation to the phonograph mechanism for accommodation in a chamber of comparative shallowness, yet being of a form which possesses particularly desirable sound amplifying qualities.

The phonograph mechanism carriage may be drawn outward and pushed inward by means of a handle 16, which may also serve for stopping the machine without pulling out the carriage. To this end the handle is shown mounted on the end of a lever 20,

which is pivotally secured at 17 to the motor board and provided with a rubber covered stud 18 to contact with the periphery of the turntable. The arrangement is such
5 that when the lever is moved in one direction, as permitted by a slotted opening 19 in the wall 5, the brake stud is carried away from the turntable, so that the latter may revolve, while when moved in the opposite
10 direction the stud is brought to bear against the periphery, being held there by the action of the record support itself. In addition, the pivot 17 may be made with sufficient friction to hold the lever either on or
15 off, or special means may be provided for the purpose.

When the carriage is drawn outward the length and rigidity of the guide rails 7, half of which, more or less, remain within the
20 guides, together with the counterbalancing effect of the horn, the greatest mass of which is located toward the end of its lever arm, insure firm support to the projecting portion of the carriage, weighted by the
25 motor and associated parts. When the phonograph is not in use the carriage is pushed all the way in, this being also the usual position when a record is being played, but if desired the sound may be varied by
30 leaving the carriage partly out, thus in-

creasing the distance between the mouth of the horn and the sound exit.

What I claim as new is:

1. A cabineted phonograph comprising a horizontally elongated casing having a
35 sound exit at one end, a carriage guided for rectilinear movement in said casing and withdrawable at the opposite end thereof, the said carriage comprising elongated side guide rails whereby it is supported when in
40 projecting relation, and a phonograph mechanism support united to said side rails at the rear portions thereof, a phonograph mechanism carried by said support, and a horn
45 movable with the carriage, said horn having its rear end in fixed connection with said support and thence extending straight forward between the side rails with its forward
end normally in proximity to the sound exit.

2. A cabineted phonograph comprising a
50 horizontally elongated casing having a sound exit at one end, a carriage guided for rectilinear movement in said casing and withdrawable at the opposite end thereof, a
55 phonograph mechanism mounted on said carriage, and a horn also carried thereby and projecting straight forward between the side guides of the carriage with its mouth normally in proximity to the sound exit.

NATHAN SHAFRAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

ACOUSTIC APPARATUS.

#1,198,844-----E. A. Hawthorne,
Patented-September 19th, 1916.
Filed-January 30th, 1913.

E. A. HAWTHORNE.
ACOUSTIC APPARATUS.
APPLICATION FILED JAN. 30, 1913.

1,198,844.

Patented Sept. 19, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

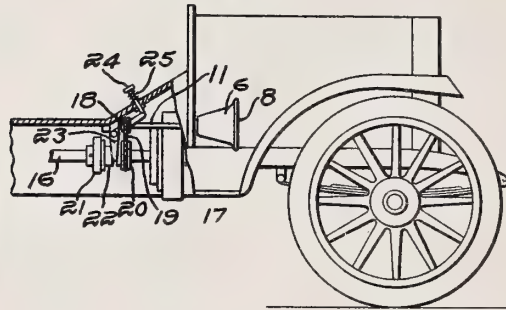


Fig. 2.

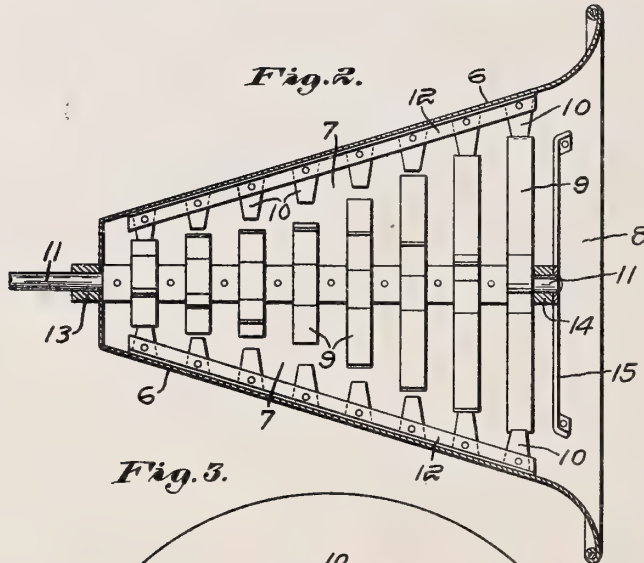
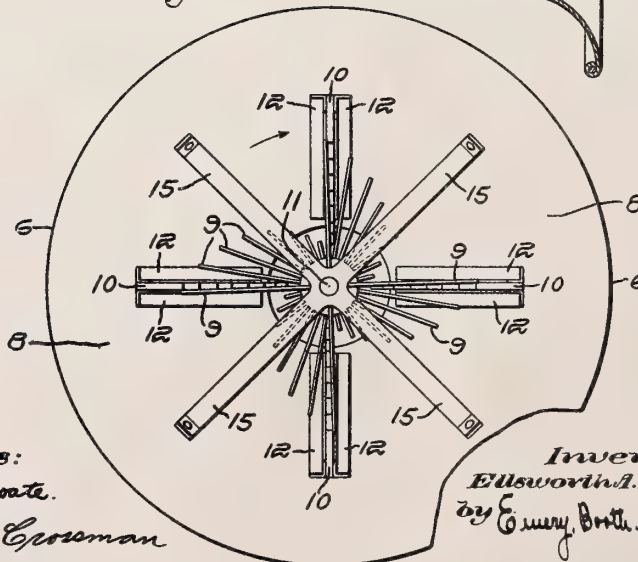


Fig. 3.



Witnesses:
Carl L. Choate.
Horace A. Crossman

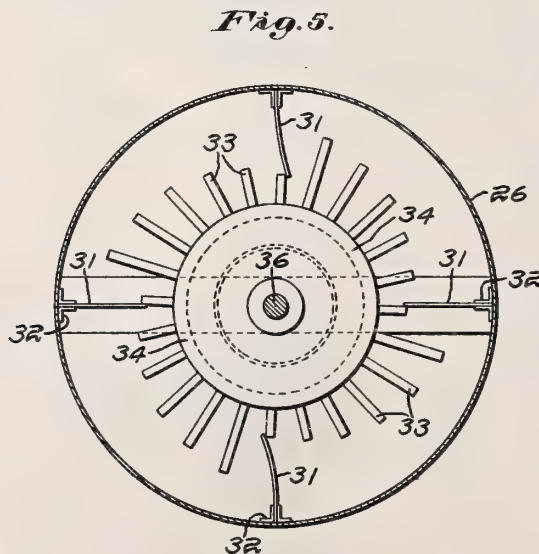
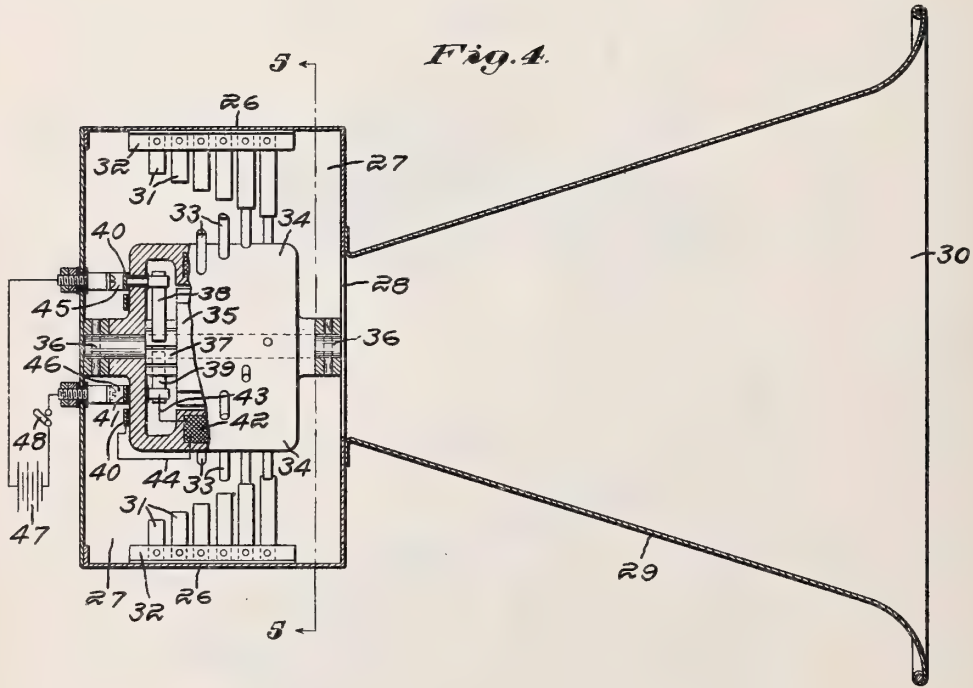
Inventor:
Ellsworth A. Hawthorne,
by Emory D. Smith, James & Barney.
Attys.

E. A. HAWTHORNE.
ACOUSTIC APPARATUS.
APPLICATION FILED JAN. 30, 1913.

1,198,844.

Patented Sept. 19, 1916.

2 SHEETS—SHEET 2.



Witnesses:
Carl L. Choate,
Horace A. Grossman

Inventor:
Ellsworth A. Hawthorne,
by Emory B. Bots, James H. Berry,
Attys.

UNITED STATES PATENT OFFICE.

ELLSWORTH A. HAWTHORNE, OF BRIDGEPORT, CONNECTICUT.

ACOUSTIC APPARATUS.

1,198,844.

Specification of Letters Patent. Patented Sept. 19, 1916.

Application filed January 30, 1913. Serial No. 745,062.

To all whom it may concern:

Be it known that I, ELLSWORTH A. HAWTHORNE, a citizen of the United States, and a resident of Bridgeport, county of Fairfield, and State of Connecticut, have invented an Improvement in Acoustic Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to acoustic apparatus, and more especially to mechanically driven horns of that general type in which a rapidly driven body is caused to vibrate the sounding means to produce a warning signal, the apparatus being particularly useful for motor vehicles.

My invention will be best understood by reference to the following specification, when taken in connection with the accompanying drawings of two embodiments thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings:—Figure 1 is an elevation, partly in section, of one form of acoustic apparatus embodying my invention, as applied to a motor vehicle, a portion of the latter being shown conventionally; Fig. 2 is a central longitudinal section, partly in elevation, of the sound amplifier, and the sound producing devices therein; Fig. 3 is an elevation of the parts shown in Fig. 2, as viewed from the mouth of the sound amplifier; Fig. 4 is a longitudinal section, partly in elevation, of another form of acoustic apparatus embodying my invention; and Fig. 5 is a sectional view on line 5—5 of Fig. 4, looking toward the left.

Referring first to Figs. 1, 2 and 3, wherein I have shown one illustrative embodiment of my invention, 6 is a suitable casing forming a sound chamber 7, said casing being in the form of a sound amplifier having a mouth, or sound-delivering opening 8. Within the sound chamber 7, there is provided a plurality of cooperating sets of sounding elements and striking elements. In the present instance, the sounding elements are in the form of vibratory elastic reeds, or the like, 9, and the striking elements are in the form of teeth 10. While the striking elements and sounding elements may be otherwise suitably arranged, herein the sounding elements are secured to a shaft 11, and disposed at different points along

the latter, while the corresponding cooperating teeth 10 are secured to the internal wall of the amplifier in any suitable manner, as for example by means of attaching strips 12, herein having a right-angle, cross-sectional form. In this form of my invention, the sounding elements and striking elements are arranged in several sets, each set including a plurality of striking elements, herein four, and a plurality of sounding elements, herein four (see Fig. 3). The sounding elements of the set nearest the mouth of the amplifier are of the greatest length, the next set is somewhat shorter, and so on toward the small end of the amplifier, and consequently, the sounding elements of each set have a different sound characteristic from the other sets, because of such difference in length, and when sounded, will produce sounds of different pitches. Herein, the shaft 11 is mounted in suitable bearings 13 and 14, the latter being supported by a spider 15.

Any suitable means may be provided relatively to rotate the shaft 11 and amplifier 6, to cause the striking elements successively to engage their cooperating sounding elements in rapid succession, thereby to sound the sounding elements. Herein, the amplifier 6 is fixed, while the shaft 11 is rotated at high speed, although this arrangement might obviously be reversed. The shaft 11 is herein driven from a power shaft 16 of a motor vehicle, the latter being designated generally by the numeral 17. While any other suitable means may be provided for utilizing the rotative movement of the power shaft at will to drive the shaft 11, the latter is herein provided with a pulley 18 connected by a belt 19 to a pulley 20 on the shaft 16, and the latter is provided with a suitable friction clutch, comprising two clutch members 21 and 22. The latter may be shifted into and out of engagement with its cooperating member by suitable means, as for example a clutch-shifting lever 23 of common form, operated by a foot button 24, there being provided a suitable spring 25, normally to retain the clutch members disengaged.

By simply pressing the foot button 24, the clutch may be engaged thereby to cause the shaft 11 to be driven at high speed, thus causing the successive engagement of the several sets of sounding devices 9 with their

coöperating striking devices 10. The character of the sound produced may, of course, be varied by suitably varying the shape or length of the sounding devices, or the material of which they are composed.

Referring now to Figs. 4 and 5, wherein I have shown another illustrative embodiment of my invention, 26 is a casing forming a sound chamber 27, having a sound-delivering opening 28, and in connection therewith, there may be employed a suitable sound amplifier 29, having a mouth 30. Within the casing 26, I provide a plurality of sets of sounding devices 31, which may be similar to those hereinbefore described, and may be secured to the casing 26 by suitable attaching strips 32. Herein the sounding devices of each set differ in length from those of the other sets (see Fig. 4).

While any other suitable means may be utilized to sound the sounding devices, I have herein provided a plurality of sets of striking elements 33, each set coöperating with one of the sets of sounding devices, the striking devices of course being of various lengths, corresponding reversely to the lengths of the sounding devices, so as to coöperate with the latter. Herein, the striking devices are in the form of pins, secured to the periphery of a rotary body 4, the latter in the present instance constituting the casing and field 34 of an electric motor. The motor, which for the sake of simplicity in illustration is shown in a conventional way, is provided with an armature 35 secured to an armature shaft 36, the latter being fixedly mounted in the casing 26, while the field 34 is arranged to rotate upon the shaft. This forms a simple and effective way of transmitting the power of the motor to the striking devices. The armature, as is customary, is provided with a commutator 37, with which two brushes 38 and 39 coöperate. The latter are suitably supported by, and insulated from the metallic casing forming the field 34, and the latter is provided externally with two collector rings 40 and 41, electrically connected to said brushes. A field winding 42 has one lead 43 connected to the brush 39, and another lead 44 connected to the collector ring 40.

Two fixed brushes 45 and 46 bearing against the collector rings 40 and 41, respectively, are mounted in and insulated from the casing 26, and are connected in circuit with a suitable source of current, herein exemplified by a battery 47, shown conventionally. A switch 48 also shown in a conventional manner, may be employed to make and break the circuit, thereby to start and stop the motor. When the motor is running, the pins 33 carried thereby travel at a high rate of speed, and successively engage the sounding devices 31, thereby producing a sound varying in pitch and quality,

according to the character of the sounding devices, sound waves passing out through the opening 28 into the amplifier 29, and being amplified by the latter.

While I have herein shown and described two forms of my invention for illustrative purposes, and have disclosed and discussed in detail the arrangement incidental to two specific applications thereof, it is to be understood that the invention is limited neither to the mere details or relative arrangements of parts, nor to its specific embodiments herein shown, but that extensive deviations from the illustrative forms or embodiments of the invention may be made, without departing from the principles thereof.

Having thus described my invention, what I claim and desire by Letters Patent to secure is:—

1. An acoustic apparatus comprising, in combination, a horn having a sound chamber provided with diverging walls, a plurality of vibratory means in said chamber, striking means, one of said means being attached to the inner surface of said diverging walls, and means relatively to actuate said striking means and vibratory means to sound the latter in succession.

2. An acoustic apparatus comprising a hollow resonant body having therein a sound chamber, a plurality of vibratory elements in said chamber, a rotatable body by which said elements are carried, and a plurality of strikers secured to the inner surface of said body and adapted to coöperate with said vibratory elements to sound the latter.

3. An acoustic apparatus comprising a sound chamber, a plurality of coplanar sets of vibratory elements of various lengths, the elements of the several sets disposed in various radial positions about an axis within said chamber, striking means, and means relatively to rotate said striking means and vibratory elements to cause said striking means to strike said vibratory elements in the several sets in rapid succession.

4. An acoustic apparatus comprising a plurality of sets of vibratory elements, a plurality of sets of striking elements, means relatively to actuate said striking elements and vibratory elements to cause the engagement of the striking elements of each set with the vibratory elements of the coöperating set in succession thereby to sound said vibratory elements, and amplifying means associated with said vibratory elements.

5. An acoustic apparatus comprising a sound chamber, a plurality of vibratory elements having different sound characteristics disposed in a progressive arrangement in various radial positions and in different planes about an axis within said chamber, striking means, and means relatively to actuate said striking means and vibratory ele-

ments to cause the latter to be sounded in succession, and means for amplifying the sound so produced.

6. An acoustic apparatus comprising a
5 tapered sound amplifying chamber, a body within said chamber, a plurality of cooperating sets of striking elements and sounding elements secured to said body and the
10 internal wall of said chamber, respectively, the set which is secured to said body having elements of progressively increasing length corresponding to the taper of said chamber, and means to impart a relative rotation to said striking elements and sound-
15 ing elements at high speed thereby to cause said striking elements to strike said sounding elements in rapid succession.

7. An acoustic apparatus comprising a sound amplifying chamber having diverg-

ing sides, a plurality of cooperating sets of
20 striking elements and sounding elements within said chamber and between said sides, one of said sets having elements of progressively increasing length corresponding to
25 the divergence of said sides, and means to impart a rapid relative motion to said striking elements and sounding elements thereby to cause said striking elements to cooperate with said sounding elements to sound the
30 latter in a continuous succession.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ELLSWORTH A. HAWTHORNE.

Witnesses:

DUDLEY M. MORRIS,
E. HORACE HAWTHORNE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH MOTOR WINDING DEVICE.

#1,198,904-----L. Foote,
Patented- Sept. 19th, 1916.
Filed-Oct. 26th, 1915.

L. FOOTE.
PHONOGRAPH MOTOR WINDING DEVICE.
APPLICATION FILED OCT. 26, 1915.

1,198,904.

Patented Sept. 19, 1916.
2 SHEETS—SHEET 1.

Fig. 2.

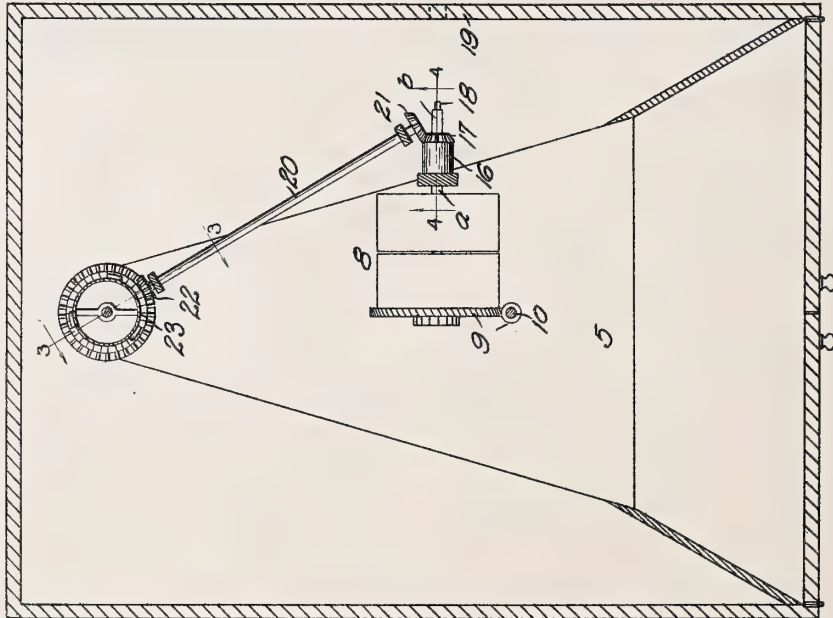
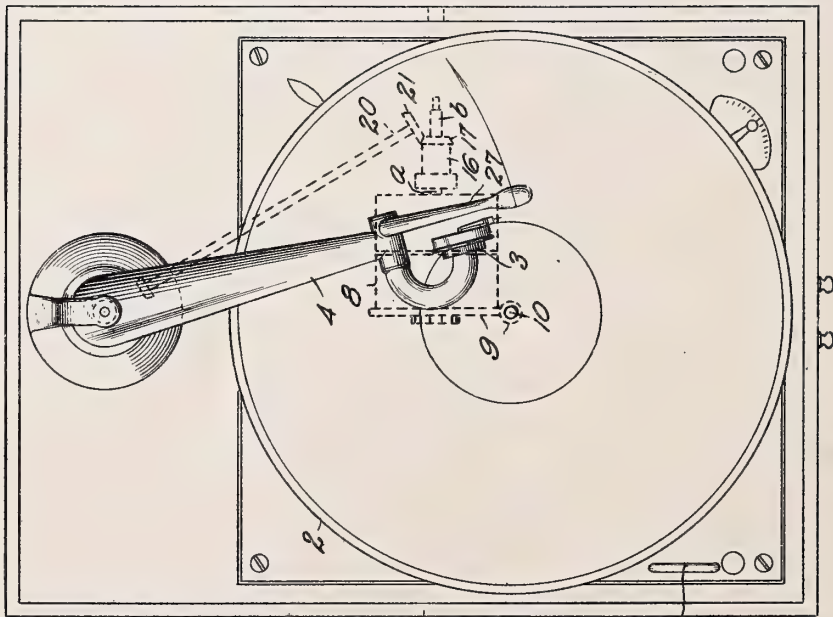


Fig. 1.



WITNESSES

C. H. Reichenbach.
Bradway

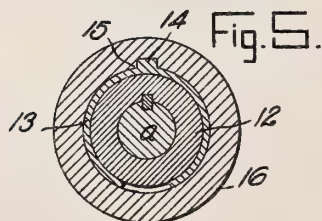
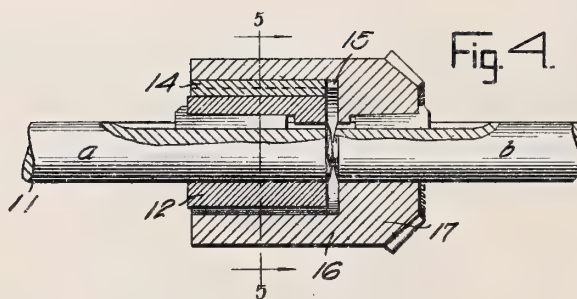
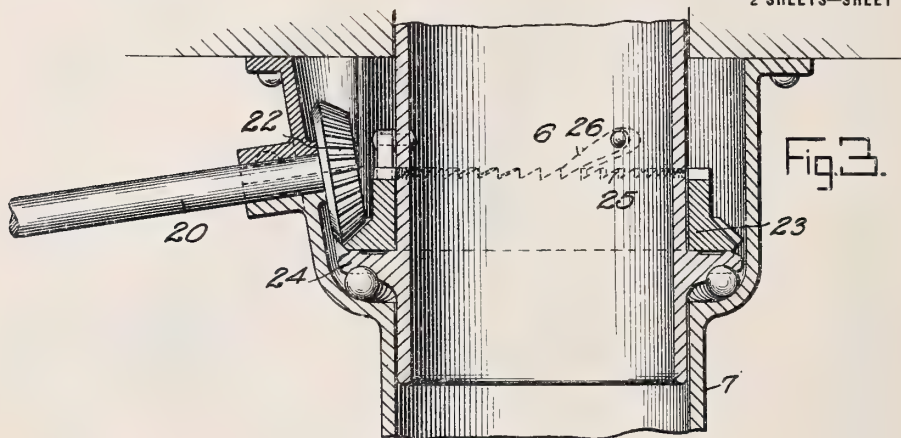
INVENTOR

Leonard Foote
BY *Mumford*
ATTORNEYS

L. FOOTE.
 PHONOGRAPH MOTOR WINDING DEVICE.
 APPLICATION FILED OCT. 26, 1915.

1,198,904.

Patented Sept. 19, 1916.
 2 SHEETS—SHEET 2.



WITNESSES
C. H. Reichenbach.
C. Broadway

INVENTOR
Leonard Foote
 BY *Mumford*
 ATTORNEYS

UNITED STATES PATENT OFFICE.

LEONARD FOOTE, OF PARAISO, CANAL ZONE.

PHONOGRAPH-MOTOR-WINDING DEVICE.

1,198,904.

Specification of Letters Patent. Patented Sept. 19, 1916.

Application filed October 26, 1915. Serial No. 57,936.

To all whom it may concern:

Be it known that I, LEONARD FOOTE, a citizen of the United States, and a resident of Paraiso, Canal Zone, have invented a new and Improved Phonograph-Motor-Winding Device, of which the following is a full, clear, and exact description.

This invention relates to phonographs, and relates more particularly to means for winding the motor which drives the record-carrying turn-table.

The invention has for its general objects to provide an improved means for winding the motor through the medium of the tone arm which carries the reproducer, whereby the swinging of the tone arm back and forth while the reproducer is in raised position will wind the motor through suitable mechanism between the tone arm and the usual winding shaft of the motor, such mechanism including a ratchet device whereby the tone arm is free to move inwardly from the periphery to the center of the record during the playing of the music, and also including a friction clutch which yields when the motor is fully wound and before the tone arm is brought back to its extreme position.

For a more complete understanding of the invention, reference is to be had to the accompanying drawings, which illustrate one embodiment of the invention, and wherein similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a plan view of a phonograph of the disk type with the improvements applied thereto; Fig. 2 is a horizontal sectional view taken through a plane to show the motor and the operating connections between the motor shaft and the tone arm; Fig. 3 is an enlarged sectional view showing the gearing and ratchet connections between the tone arm and the shaft intermediate such tone arm and motor shaft; Fig. 4 is an enlarged sectional view on the line 4-4, Fig. 2, to show the yielding clutch device for the motor; and Fig. 5 is a sectional view on the line 5-5, Fig. 4.

Referring to the drawings, 1 designates a phonograph cabinet case, 2 the record-carrying turn-table, 3 the reproducer, 4 the tone arm, and 5 the amplifying horn which is connected in the usual manner with the vertical or axle portion 6 of the tone arm, which axle portion is disposed in the neck 7 of the horn, as shown in Fig. 3. The usual spring motor 8 is connected through the

worm gearing 9 with the shaft 10 of the turn-table 2. The motor has a shaft 11 made in two sections *a* and *b*, and keyed to the section *a* is a sleeve 12 forming an element of a clutch, the other element being a split spring sleeve 13 having an external key 14 engaged in a keyway 15 in the cylindrical section 16 of the beveled gear 17 which is keyed to the shaft section *b*. The shaft section *b* may have its end 18, Fig. 2, so shaped as to be engaged with an operating crank which is inserted through an opening 19 in the side of the casing, whereby the motor can be wound by hand. The clutch device formed by the elements 12 and 13 forms a yielding connection between the two sections of the shaft so that the motor springs cannot be wound too tight. The use of an operating crank for winding the motor is intended only in case of emergency, as the motor is intended to be wound by the movement of the tone arm 4.

Any suitable operating means may be employed between the tone arm and the gear 17 to rotate the latter for winding the motor, but in the present instance a secondary shaft 20 extends from the tone arm to the motor and has on one end a beveled gear 21 which meshes with the beveled gear 17, and the opposite end of the shaft 20 has a beveled gear 22 which meshes with a beveled gear 23 in the form of a ring loosely mounted on an annular bearing flange or equivalent part 24 carried by the vertical portion 6 of the tone arm, as shown in Fig. 3. This gear 23 has ratchet teeth 25 with which coöperate pawls 26 pivoted on the vertical portion 6 of the tone arm. These ratchets permit the tone arm to move freely during the movement of the tone arm while the record is playing. That is to say, the arm can move freely from the right to the left as the needle travels from the periphery toward the center of the record, but in moving the arm in the opposite direction the pawls engage the ratchet teeth to positively connect the tone arm with the motor, whereby the latter is wound. The tone arm can be swung back and forth through its full range of movement for the purpose of fully winding the motor. The tone arm is preferably provided with a handle 27, Fig. 1, so that the tone arm can be swung back and forth, the reproducer being of course thrown up and back to its raised position so as to be out of the way of the record or

the turn-table. It may be desirable to grip the phonograph with one hand while the other hand is operating the tone arm to wind the motor, and for this purpose a 5 grip 28 is fastened to the cabinet at any suitable point, as shown in Fig. 1. As the tone arm is of considerable length the motor can be wound with comparatively little exertion. If the motor is completely wound 10 while the tone arm is not at the limit of its movement to the right, the clutch in the motor shaft will slip so that the tone arm can be brought back to a position where the needle can be engaged with the beginning of 15 the record.

From the foregoing description taken in connection with the accompanying drawings, the advantages of the construction and method of operation will be readily understood by those skilled in the art to which the invention appertains, and while I have described the principle of operation, together with the apparatus which I now consider to be the best embodiment thereof, 25 I desire to have it understood that the apparatus shown is merely illustrative and that such changes may be made when desired as fall within the scope of the appended claims.

30 Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a phonograph, the combination of a record carrying table, a motor for driving the same, a tone arm, and means between the tone arm and motor for winding 35 the latter by the movement of the tone arm.

2. In a phonograph, the combination of a record carrier, a motor for driving the same, 40 a reproducer carrier, and an operating connection between the reproducer carrier and motor whereby movement of the carrier in one direction winds the motor.

3. In a phonograph, the combination of a 45 record carrier, a motor for driving the same, a tone arm, and a transmission mechanism between the tone arm and motor, said mechanism including a ratchet device, whereby

the tone arm moves freely during the playing of the record and is positively connected 50 with the motor during the opposite movement of the tone arm, whereby the latter winds the motor.

4. In a phonograph, the combination of a record carrier, a tone arm, a gear associated with the tone arm, a ratchet and pawl device between the tone arm and gear, whereby the gear moves with the tone arm in one direction and is free during movement in the opposite direction, a motor for 60 driving the carrier, and operating connections between the gear and motor for winding the latter.

5. In a phonograph, the combination of a record carrier, a tone arm, a gear associated with the tone arm, a ratchet and pawl device between the tone arm and gear, whereby the gear moves with the tone arm in one direction and is free during movement in the opposite direction, a motor for 70 driving the carrier, a shaft having a gear engaged with the first-mentioned gear, and connections between the shaft and motor and including a clutch which yields when the motor is fully wound and while the tone 75 arm is moved to the limit of its motor-winding movement.

6. In a phonograph, the combination of a record carrier, a motor operatively connected therewith and including a shaft consisting of two sections, and a yielding clutch coupling between the two sections of the shaft, a tone arm, and an operating connection between the tone arm and motor shaft, whereby the tone arm drives the latter, said 85 connection including a ratchet and pawl device for permitting the tone arm to move freely in a direction to permit a record on the carrier to be played.

In testimony whereof I have signed my 90 name to this specification in the presence of two subscribing witnesses.

LEONARD FOOTE.

Witnesses:

J. B. SILER,

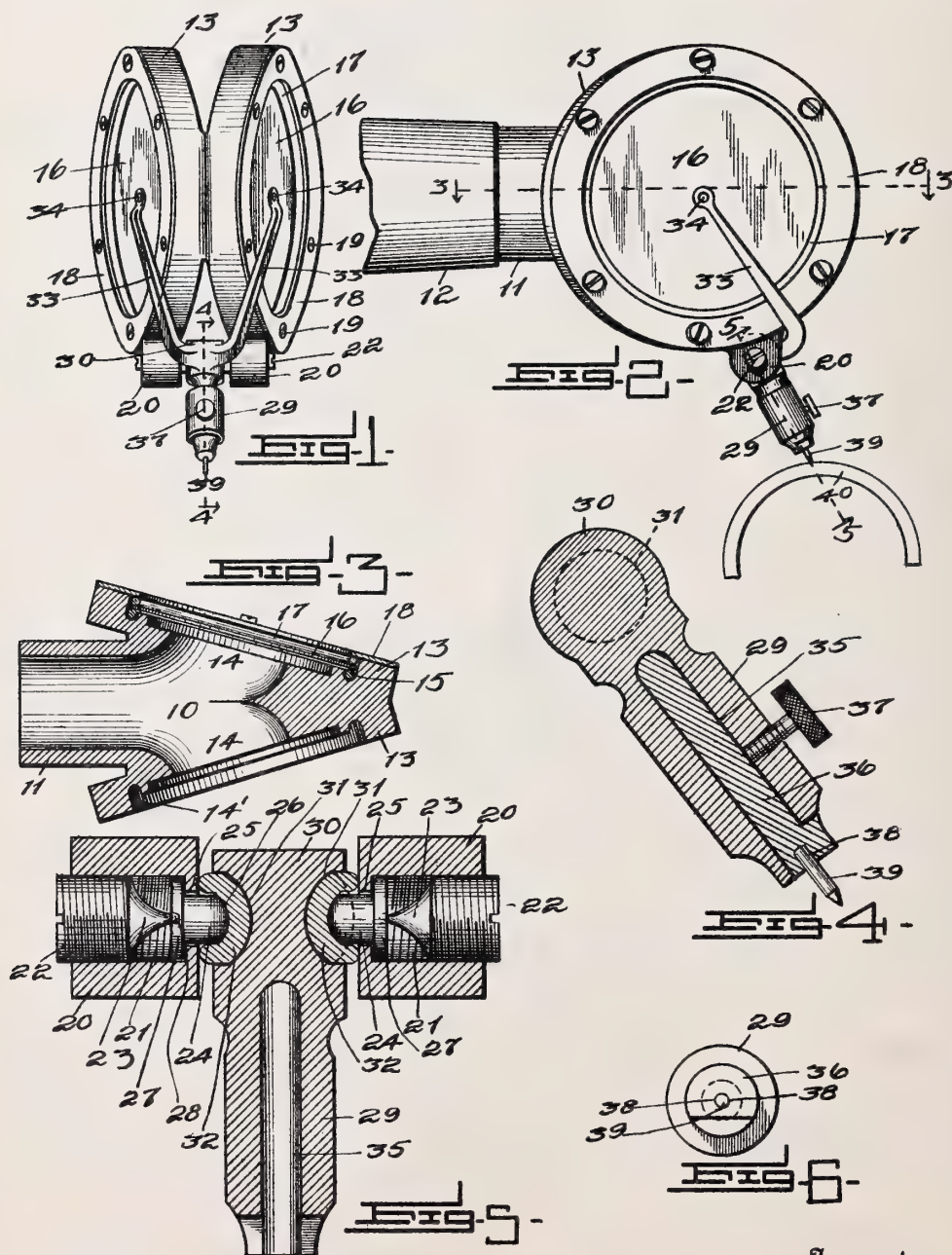
JOHN D. DAILY.

GRAMOPHONE,
#1,198,977-----M. Vignali,
Patented-Sept. 19th, 1916.
Filed-February 4th, 1914.

M. VIGNALI.
GRAMOPHONE.
APPLICATION FILED FEB. 4, 1914.

1,198,977.

Patented Sept. 19, 1916.



Witnesses
M. Lyne
B. M. Milburn

By

Inventor
Merello Vignali,
C. L. Parker
Attorney

UNITED STATES PATENT OFFICE.

MARCELO VIGNALI, OF MONTEVIDEO, URUGUAY.

GRAMOPHONE.

1,198,977.

Specification of Letters Patent. Patented Sept. 19, 1916.

Application filed February 4, 1914. Serial No. 816,573.

To all whom it may concern:

Be it known that I, MARCELO VIGNALI, a citizen of the Republic of Uruguay, residing at Montevideo, in Uruguay, have invented certain new and useful Improvements in Gramophones, of which the following is a specification.

My invention relates to apparatus for recording or reproducing sounds and has particular reference to improvements in a sound box included therein, and embodying a plurality of diaphragms arranged in a novel manner and connected with a single needle-carrying lever.

An important object of the invention is to provide means of the above mentioned character, which will record and reproduce sounds, vocal, musical or the like, in a clear and full manner.

A further object of the invention is to provide means of the above mentioned character, which is light, strong, durable, simple in construction, and convenient in use.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same, Figure 1 is a side elevation of apparatus embodying my invention, the same being shown in the operative position, Fig. 2 is a rear end elevation thereof, Fig. 3 is a horizontal sectional view taken on line 3—3 of Fig. 2, Fig. 4 is a longitudinal sectional view taken on line 4—4 of Fig. 1, Fig. 5 is a similar view taken on line 5—5 of Fig. 2, parts being omitted, and, Fig. 6 is an end view of the needles and associated elements.

My apparatus, which may constitute either a recorder or reproducer, comprises a shell or sound box 10, which is preferably cast or formed of aluminum, owing to the strength and lightness of such material. Extending forwardly from the shell or sound box 10 is a reduced tube or neck 11, adapted for connection with a horn 12, as is customary. Formed upon the opposite sides of the shell or sound box 10 are preferably vertically arranged rings or open frames 13, which are disposed at an acute angle with relation to each other. The shell or sound box 10 has its opening or bore forked at one end thereof, forming oppositely extending passages 14, which lead into

the openings of the rings or frames 13, as shown. The rings or open frames 13 are provided with annular grooves 14', receiving packing rings 15, preferably formed of rubber or some other highly elastic material. Mounted within the rings or frames 13 and engaging the packing rings 15, are flexible diaphragms or membranes 16, which may be formed of any suitable material, while I have found that satisfactory results are obtainable by forming them of ivory or gold. These flexible diaphragms or membranes are held in place by packing rings 17, preferably formed of rubber, and engaging the edges of the diaphragm, as shown. These packing rings are in turn held in place by detachable rings 18, preferably formed of aluminum. The rings 18 are connected with the rings or open frames 13 by means of screws 19 or the like, as shown.

As more clearly shown in Figs. 1 and 2, the rings or open frames 13 are provided upon their lower portions with depending spaced lugs or ears 20, shown in detail in Fig. 5. These lugs or ears 20 are provided with main axially extending screw-threaded openings 21, receiving externally screw-threaded adjusting elements or screws 22. Each of the screws 22 is provided at its inner end with a tapered or conical portion 23, decreasing in diameter outwardly, as shown. The numeral 24 designates pivot studs or elements, passing through openings 25 formed through the ends of the lugs or ears 20. The outer ends of the studs or elements 24 are curved or rounded, as shown at 26, while the inner ends thereof are provided with enlarged heads 27, which are adapted to be moved longitudinally within the screw-threaded openings 21, but having no screw-threaded engagement therewith. Each head 27 is provided centrally thereof with an opening or recess 28, receiving the reduced outer end of the tapered extension 23.

The numeral 29 designates a vibratory lever, provided at one end with a head 30, having curved recesses or chambers 31 formed upon the opposite faces thereof. These recesses or chambers contain pads or packing 32, preferably formed of rubber or some other highly elastic material. The pivot studs 24 extend into the recesses 31 and engage therein, with the elastic pads 32. It is thus seen that the vibratory lever 29 is pivotally connected between and with the

lugs or ears 20, to swing in substantially vertical planes, the amount of friction that the pivotal connection of this lever will offer upon the swinging of the same, being regulated by the adjustment of the screws 22.

As more clearly shown in Figs. 1 and 2, the numeral 33 designates vertically inclined arms arranged at an acute angle, and diverging upwardly. These arms are rigidly connected with the head 30 of the lever 29 and are preferably cast integral therewith. The arms 33 are relatively rigid, being preferably formed of aluminum, of which the lever 29 is also preferably formed. It is thus seen that the arms 33 and lever 29 are adapted to swing or vibrate in substantially vertical planes. The upper ends of the arms 33 are arranged outwardly of and adjacent the vibratory diaphragm or membranes 16, and are pivotally connected therewith, as shown at 34.

As more clearly shown in Figs. 4 and 5, the vibratory lever 29 is provided with a longitudinally extending opening or recess 35, for receiving a removable rod or element 36, adapted to be clamped therein by a binding post 37 or the like. The element 36 is provided at its lower end with an opening 38, receiving needle 39, which may be constructed of any suitable material, while I have found that highly satisfactory results are obtainable by making it of sapphire. The needle may be held in the opening 38 by frictional engagement or by any other suitable means.

The numeral 40 designates a cylinder record, operating in engagement with the needle or needles 39. My apparatus may be just as well employed in connection with a disk record, the record 40 being simply shown, in connection with the apparatus, for the purpose of illustration.

In the use of the apparatus as a reproducer, it is obvious that as the record 40 which may be of the Berliner type with horizontally undulating sound grooves rotates in slidable engagement with the needle

39, such needle will be vibrated, to impart an oscillatory vibratory movement to the lever 29 and arms 33, which movement causes the diaphragms or membranes 16 to properly vibrate, to reproduce the sound.

When the apparatus is used as a recorder, the operation is reversed, the diaphragms being primarily vibrated, causing the lever 29 and arms 33 to partake of an oscillatory vibratory movement, whereby the needles 39 will be vibrated while having slidable contact with the revolving record cylinder, to cut the sound grooves therein.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having described my invention, I claim:

In apparatus of the character described, a sound box, a plurality of flexible diaphragms connected therewith in spaced relation, a swinging needle-carrying member arranged near the sounding box and provided as its turning point with oppositely arranged recesses, highly elastic pads disposed within the recesses to permit of perceptible lateral vibration of the member, internally screw-threaded tubular ears connected with the sounding box, pivot studs rotatably mounted within the ears and extending outwardly therefrom to engage the highly elastic pads, screw-threaded adjusting elements arranged within the screw-threaded tubular ears with their inner ends engaging the pivot studs, and arms connected with the needle-carrying member and with the flexible diaphragms.

In testimony whereof I affix my signature in presence of two witnesses.

MARCELO VIGNALI.

Witnesses:

LEOPOLDO ASPESTI,
JOSE AGUSTIN PIANAVIA.

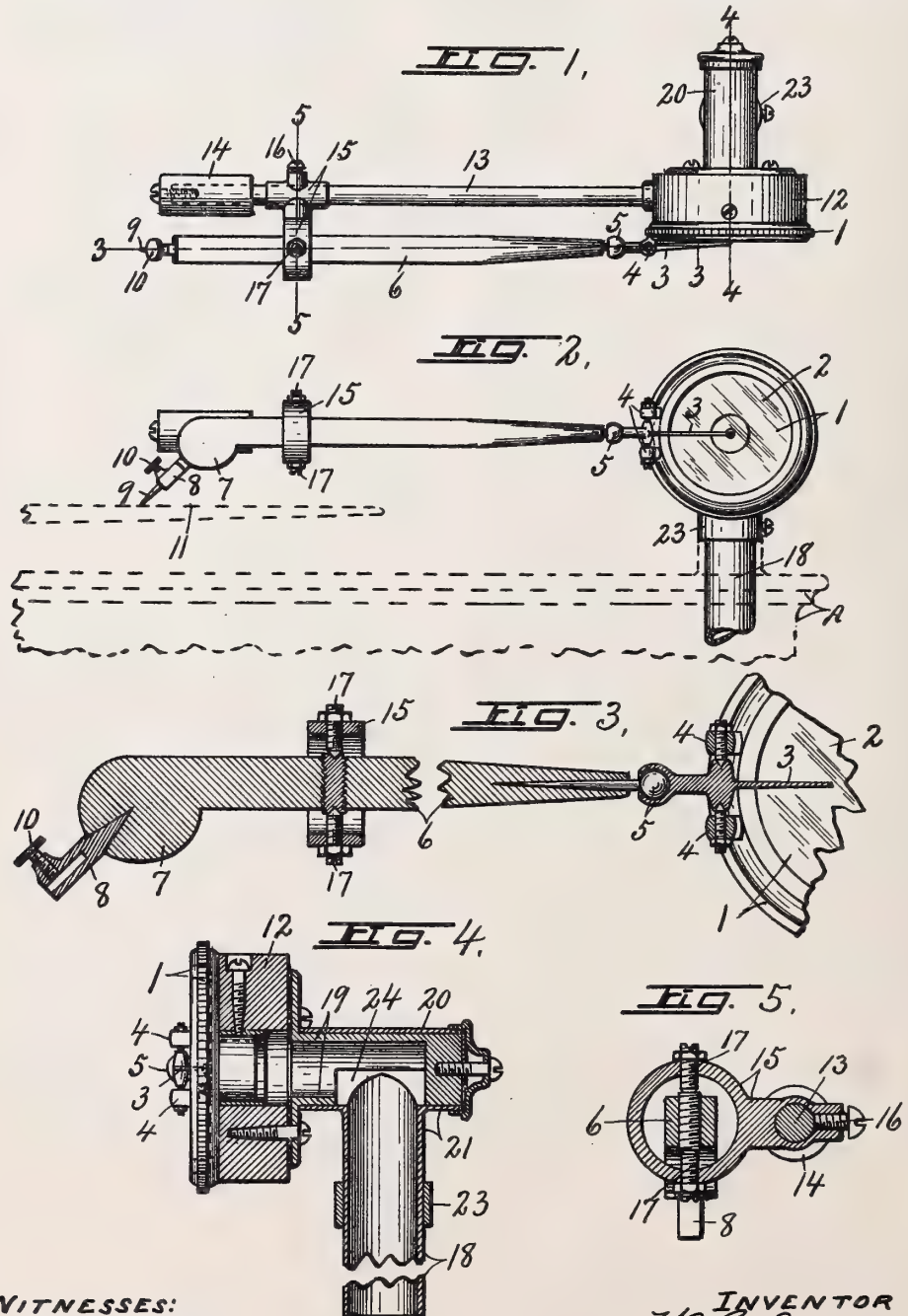
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

REPRODUCER ATTACHMENT FOR PHONOGRAPHS,
#1,199,040-----W. G. Adams,
Patented-September 26, 1916.
Filed-October 6th, 1914.

W. G. ADAMS.
 REPRODUCER ATTACHMENT FOR PHONOGRAPHS.
 APPLICATION FILED OCT. 6, 1914.

1,199,040.

Patented Sept. 26, 1916.



WITNESSES:

H. Hurst.
W. E. Chare

INVENTOR
W. G. Adams
 BY *Howard P. Russell*
 ATTORNEY.

UNITED STATES PATENT OFFICE.

WILLARD G. ADAMS, OF WEEDSPORT, NEW YORK.

REPRODUCER ATTACHMENT FOR PHONOGRAPHS.

1,199,040.

Specification of Letters Patent. Patented Sept. 26, 1916.

Application filed October 6, 1914. Serial No. 865,306.

To all whom it may concern:

Be it known that I, WILLARD G. ADAMS, a citizen of the United States, and resident of Weedsport, in the county of Cayuga, in the State of New York, have invented new and useful Improvements in Reproducer Attachments for Phonographs, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in reproducer attachments for phonographs, and involves the use of a non-metallic needle-supporting extension of the vibrator-arm as one feature, and a non-metallic ring co-axial with and secured to the back of the diaphragm case carrying a radially projecting weighted arm or bracket for supporting the non-metallic extension and holding the tracer point in yielding engagement with the undulations of the record.

The main object is to reproduce more accurately and definitely the sound records by eliminating as far as possible the accompanying metallic sounds incidental to the use of relatively long metallic tubes carrying the diaphragm case and needle point, as in the standard makes of machines of the "Victrola", "Columbia" and "Edison" type. In other words, I have sought to accomplish these results by locating the reproducer as closely as possible to the resonator or amplifier and relatively remote from the needle point by interposing a relatively long intermediate non-metallic bar having one end attached to the vibrator-arm connected to the diaphragm and its other end provided with a needle holder.

The object of the non-metallic ring on the diaphragm case is to permit the use of a suitable weighted support for the non-metallic bar without liability of transmitting metallic sounds from said support to the diaphragm of the reproducer or to the resonator with which the reproducer communicates.

Another object is to enable this attachment to be used in connection with any of the standard forms of reproducers.

Other objects and uses relating to specific parts of the device will be brought out in the following description.

In the drawings—Figure 1 is a top plan of a standard form of reproducer equipped with my improved attachments. Fig. 2 is a side elevation of the same, the dotted lines showing respectively a portion of a record disk and a portion of the cabinet containing the resonator or amplifier. Fig. 3 is an enlarged longitudinal vertical sectional view through the connecting bar between the needle point and reproducer showing the means for connecting said bar to the vibrator-arm taken on line 3—3, Fig. 1. Fig. 4 is an enlarged vertical sectional view of the attachment at the back of the reproducer taken on line 4—4, Fig. 1, except that the reproducer is shown in elevation. Fig. 5 is a transverse vertical sectional view through the connection between the non-metallic needle bar and its supporting bracket taken on line 5—5, Fig. 1.

In order that my invention may be clearly understood, I have shown a standard type of reproducer —1— having the usual diaphragm —2— and an operating lever —3— therefor, the latter being fulcrumed intermediate its ends in suitable bearings —4— on the diaphragm case with one end attached to the diaphragm and its other end flexibly connected by a ball and socket joint —5— to the adjacent end of a non-metallic extension bar or lever —6— of wood or equivalent fibrous material, the opposite end of said bar being enlarged at —7— for receiving a needle holder —8— having a tracer point or needle —9— secured therein by a set screw —10— so as to follow the undulations or sound record of a record disk or cylinder —11—.

Secured to the back of the diaphragm case —1— is a non-metallic ring —12— of wood or other fibrous material capable of receiving and supporting a radially projecting arm or bracket —13— which is secured at one end to the periphery of the ring —12— and has its other end weighted by an extra member —14— and provided with a yoke —15— for receiving and supporting the ad-

jacent end of the bar —6—, said yoke being secured to the bracket —13— by a set screw —16— and provided with opposed screws —17— for engaging opposite sides of the bar —6— to hold the latter in a substantially balanced position, thereby allowing said bar to respond easily to the action of the needle point on the undulations of the record disk for accurately transmitting such action to the diaphragm of the reproducer through the vibrator-arm —3—.

By using this attachment, the reproducer may be brought into close proximity to the entrance tube as —18— of the resonator box within the cabinet —A— as the non-metallic bar —6— is interposed between the reproducer and needle point —9—, thus obviating the use of the usual long metallic tube leading from the reproducer to the entrance tube of the resonator, as in the standard types of machines now in use in which the reproducer with a needle point attached thereto is directly over the record.

In order that the reproducer and attachments may be free to swing vertically and horizontally a tubular hub —19— is secured to the back of the non-metallic ring —12— and is journaled in a head —20— of a T-shaped pipe —21— having its vertical portion journaled in a suitable bearing —23— in the top of the cabinet so as to permit the reproducer with the attachments thereon to rotate in vertical and horizontal planes or rather in planes at right angles to each other. the hub —19— having a considerable portion of one side thereof cut away at —24— to register with the upright portion of the pipe —21— for permitting the transmission of sound waves from the diaphragm to the resonator with which the lower end of the pipe 18 is connected in any well-known manner not necessary to illustrate or describe.

The ball-and-socket joint —5— allows the bar —6— and reproducer —1— to be turned relatively to each other to adapt the needle point —9— to different makes of phonographs, as for example, the "Edison", "Columbia" and "Victrola". That is, the needle supporting bar —6— may be adjusted so that the needle and reproducer will face the record as in the "Edison" machine, or may, as shown in the drawings, be adjusted so that the needle will extend in a direction parallel to the face of the reproducer, as in the "Columbia" and "Victrola".

In adapting this reproducer for Edison records, the tube —18— with the reproducer thereon would be withdrawn from the socket in which it is shown and an elbow tube, not shown, placed in the socket in the case —A— with one arm in a substantially horizontal position in which the tube —18— would then be inserted so as to bring the face of

the reproducer at the under side, under which conditions the pivotal screws —17— for the bar —6— would be loosened to release said bar, which would then be turned a quarter turn to bring the needle —9— at the under side, whereupon the screws —17— would be re-tightened against the adjacent side of the bar to hold the latter in operative relation to its supporting member —13—. The tapering points of the pivotal pins —17— would, of course, enter the wood at right angles to the axis of the metal bushing shown in Fig. 3, in which the pins are there shown engaged, it being evident that similar metal bushings could be provided in all four sides of the wood bar to receive the pointed ends of the pins if necessary, but the device is entirely operative if the pins enter the wood, the latter being usually made of maple or similar hard wood.

What I claim is:

1. In a phonograph reproducer, a metal diaphragm-actuating lever and a needle-supporting wood extension thereof of greater length than the lever, said lever and extension being flexibly connected end to end, and an additional support for the extension intermediate the ends thereof.

2. In a phonograph reproducer, a metal diaphragm-actuating lever, and a needle-supporting extension of wood and of greater length than the lever, said lever and extension being connected end to end by a ball and socket joint, and an additional support for the extension intermediate the ends thereof.

3. In a phonograph reproducer, a metal diaphragm-actuating lever and a wood bar having one end connected by a ball and socket joint to one end of the metal lever and its other end provided with a needle holder, and means for pivotally supporting the bar at a point between the ball and socket joint and needle holder.

4. In a phonograph reproducer, a diaphragm-actuating lever, a needle-supporting bar of wood of greater length than the lever and forming an extension thereof, a weighted arm secured to the diaphragm case and extending along one side of the wood extension and provided with means for pivotally supporting said extension.

5. In a phonograph reproducer, a diaphragm-actuating lever of metal fulcrumed on the diaphragm-case, a wood bar of relatively greater length than the lever and forming an extension thereof, a needle holder on the bar, connections between the bar and lever, and means for pivotally supporting the bar at a point intermediate its ends.

6. In combination with a phonographic reproducer having its diaphragm case mounted to rock about its axis and provided

with a vibrator-arm, of a non-metallic point-
supporting extension attached to said arm, a
hollow non-metallic ring secured to said case
to rock therewith, and connections other
5 than the vibrator-arm and case between the
ring and extension for causing the extension
to rock with the case.

In witness whereof I have hereunto set
my hand this 26th day of September 1914.

WILLARD G. ADAMS.

Witnesses:

H. E. CHASE,

ALICE M. CANNON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

TALKING MACHINE,
#1,199,192-----M. Krauss,
Patented- Sept. 26th, 1916.
Filed-April 19th, 1916.

M. KRAUSS.
TALKING MACHINE.
APPLICATION FILED APR. 19, 1916.

1,199,192.

Patented Sept. 26, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

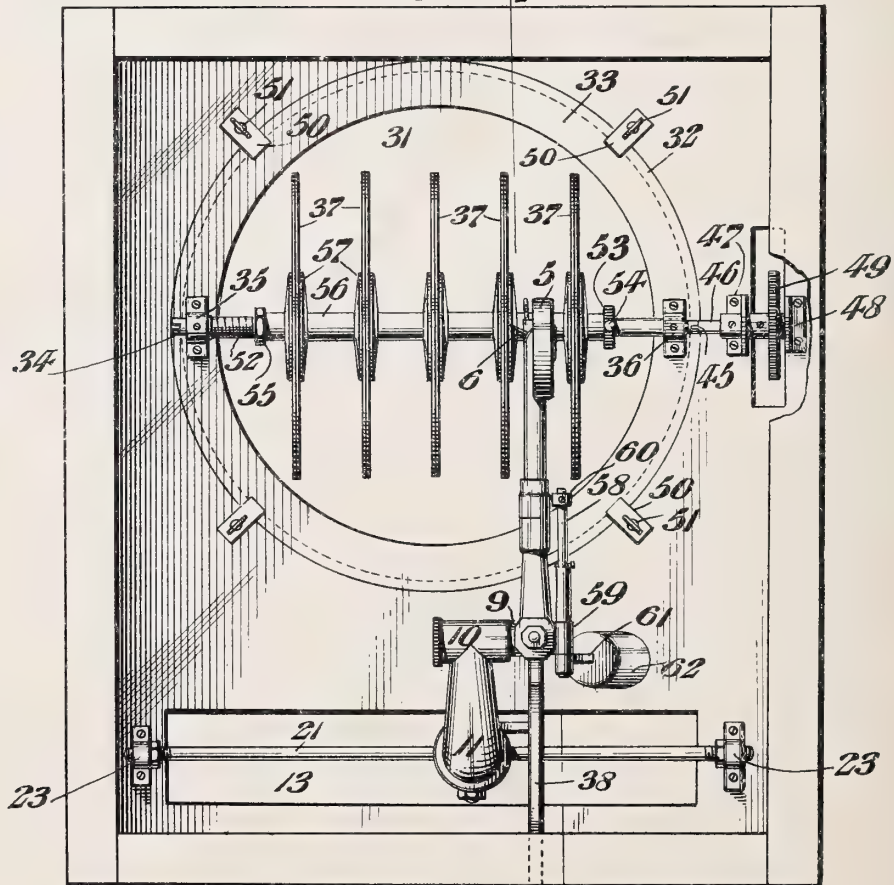
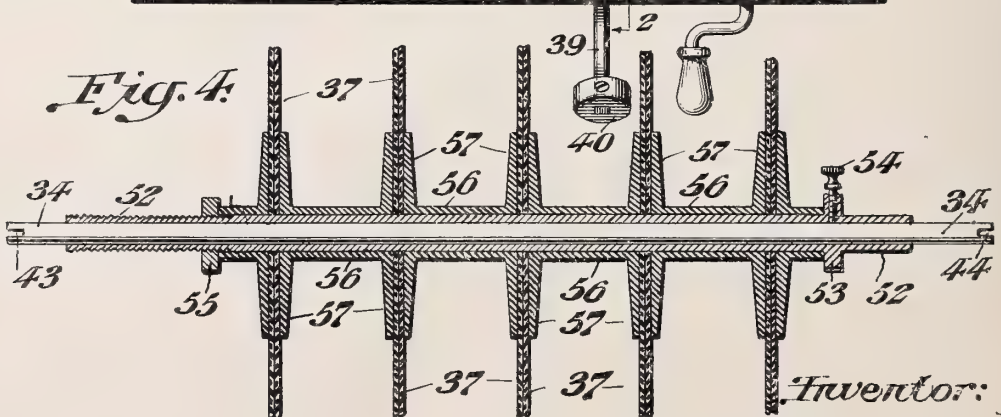


Fig. 4.



Inventor:

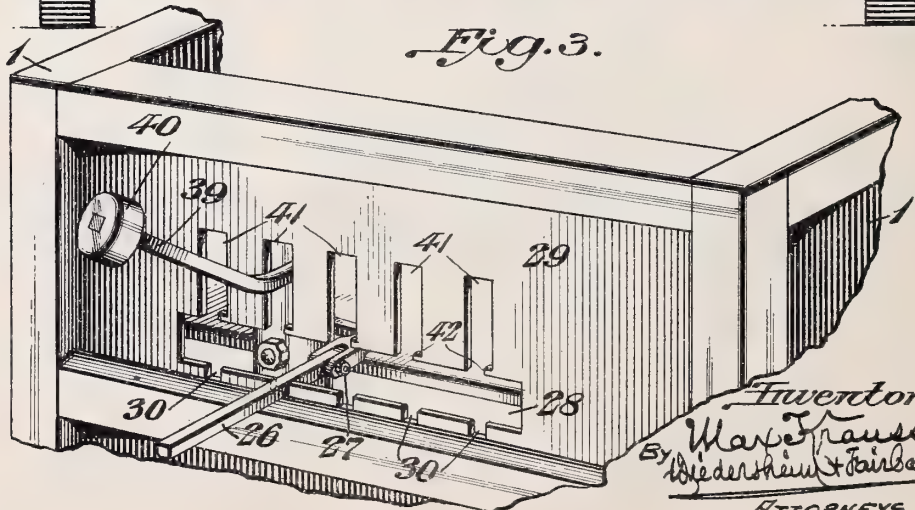
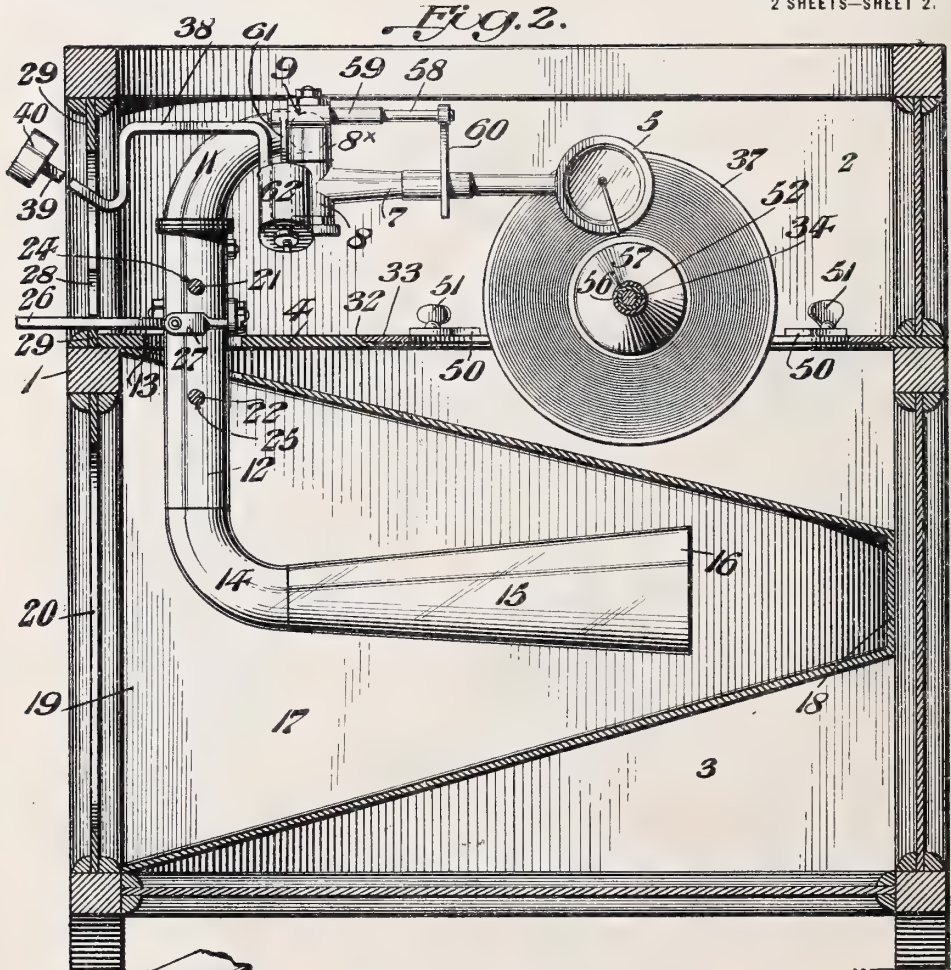
Max Krauss.
By *Roderick Fairbanks*
ATTORNEYS:

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TALKING MACHINE.
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1,199,192.

Patented Sept. 26, 1916.

2 SHEETS—SHEET 2.



Inventor:
Max Krauss.
By *Wiedersheim & Fairbanks*
ATTORNEYS

UNITED STATES PATENT OFFICE.

MAX KRAUSS, OF PHILADELPHIA, PENNSYLVANIA.

TALKING-MACHINE.

1,199,192.

Specification of Letters Patent. Patented Sept. 26, 1916.

Application filed April 19, 1916. Serial No. 92,073.

To all whom it may concern:

Be it known that I, MAX KRAUSS, a subject of the King of Bavaria, having resided in the United States one year last past and having declared my intention of becoming a citizen thereof, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Talking-Machine, of which the following is a specification.

My invention relates to the general class of talking or sound-reproducing machines which play records in the form of flat disks, and has for its primary object the construction of a machine in which a plurality of records, either single or double-faced, and of any desired diameter, can be set up, and any one of them, at the selection of the operator, be played,—the entire group being adapted to be turned around to present to the stylus their opposite faces, or be taken out and replaced by another group.

The general plan and organization of the machine is such that it is a mere matter of dimensions as to what number, or diameter or character of disk records it can play,—a large machine being capable of receiving and playing a larger number of records than a smaller machine. The machine, moreover, is adapted for use with any form of sound box, the stylus of which can operate upon either the up-and-down tone groove of the type of the "Edison" or the in-and-out tone groove of the type of the "Victor" machines, only one sound box being necessary to enable the operator to at will select and play any one of any desired number of records which happen to be set up in the machine. The machine, moreover, is capable of being operated by any preferred type of motor, mechanical or electrical, and in its construction but one amplifier is required, the organization of which is such that it is operative in connection with the tone arm and horn of the sound box, without regard to which of the records is that, for the time, being played upon.

With these primary ends in view and for the purpose of the construction of an inexpensive, mechanically simple and durable machine, I have resorted to a construction which I have hereinafter explained,—for the purpose of simplifying the description, having shown a machine adapted to operate with a plurality or group or series of five records only, all in vertical disposition, al-

though of course the group may be disposed horizontally, the entire cabinet and motive mechanism being correspondingly reversely disposed. As already stated, moreover, it is a mere matter of the proportioning of the machine and the duplication of certain parts hereinafter described, to adapt the machine to play a much larger number of records than five.

In the accompanying drawings I have, for the purpose of illustrating my invention, shown a certain type and embodiment of it which is at present preferred by me, because in practice it has given satisfactory and reliable results. It is to be understood, however, that the various instrumentalities in which my invention is embodied can be variously arranged and organized and that my invention is not therefore limited to the precise arrangement and organization of such instrumentalities as are typified in the construction illustrated in the accompanying drawings and herein described.

In the accompanying drawings: Figure 1 represents in top plan, a talking machine embodying my invention. Fig. 2 represents in side sectional elevation on the dotted line 2—2 of Fig. 1, the machine of Fig. 1, certain of its component instrumentalities being shown in side elevation. Fig. 3 is a fragmentary perspective of the upper portion of the front of the casing, the view particularly illustrating the selector plate, the record selector lever, and the horn carrier adjusting arm. Fig. 4 represents a longitudinal, vertical, central, section through the record driving shaft, the record-carrying sleeve upon said shaft, the record-clamping hubs upon said sleeve, and a plurality of five disks.

Similar numerals of reference indicate corresponding parts.

Referring to the drawings: 1 designates a vertically standing casing or cabinet of any preferred character, material and dimensions, which by means of a partition 4, shown as horizontally disposed, is divided into two hollow interior compartments, the upper of which I designate 2 and the lower 3.

Within the upper compartment is located a vertically-disposed sound-box 5, of any preferred type and carrying the usual laterally extending stylus 6. From the sound-box extends the tone arm proper, 7, in the form shown a horizontally-disposed

hollow tube, which at its outer or front end is connected by a compound, universal or swiveling, connection with the horn-carrier 12, hereinafter explained. This compound connection is conveniently composed of the following devices:—8 is a hollow vertical interior bushing into which the outer end of the tone arm merges and which is so fitted as to be rotatable within an outer carrying bushing 8*. This carrying bushing 8* is itself provided with a laterally extending or horizontal bushing 9, fitted and rotatable within a hollow horizontal boxing 10 into which merges and is fitted, or otherwise properly connected, the hollow upper elbow 11, or forty-five degree union, which extends downward so as to terminate in and be connected with a hollow horn-carrier 12, which extends down through a transverse slot or opening 13 through the partition 4 into the lower compartment 3, and is therein provided with the reversely or backwardly turned lower hollow elbow 14, from the inner end of which is extended a conveniently attached conical, preferably metal, horn 15, the sound-opening or throat 16 of which extends rearwardly within, and in transverse disposition to, a forwardly extending wooden amplifier 17 formed within the lower compartment, extending transversely or sidewise throughout said compartment so as to afford room for the transverse movement of the horn carrier from side to side within the lower compartment.

At the rear or narrow end 18, the amplifier is closed to confine the sound, and at the front or outer enlarged end 19, the amplifier is opened preferably to the extent of the entire depth and width of the front of the lower compartment of the casing, which is formed with sound slots 20, or simply closed by doors or movable slats in a manner well understood in these machines.

21, 22 are a pair of fixed carrying rods or track bars, parallel with each other, and preferably one above and the other below the partition 4, to which they are connected conveniently by fastening devices, such as brackets 23, one of which above the partition is shown in Fig. 1, and the other of which, not shown, is presumed to be connected with the under surface of the partition. Each of these carrying rods passes through apertured bearings in the side walls of the horn-carrier 12, which may be supplied with opposite pairs of bearings 24, 25, not shown in detail, so that the horn-carrier is stayed upon, and supported by, said carrying rods and is capable of transverse or sidewise and preferably manual movement upon them in either direction within the casing, so as in such movement to carry with it in either direction the sound box and its tone arm connections 7, 8, 8*, 9, 10,

11, and 14, and also the metal horn 15. The control of this lateral movement of the horn-carrier and its adjuncts is, as stated, preferably manual, and conveniently, effected by a horn-carrier adjusting-arm 26, which at its inner end is pivoted at 27 to the horn-carrier 12, and at its outer end extends through a horizontal, longitudinally-extending slot 28 cut through what I term a selector-plate 29, which is a plate or front wall closing the upper compartment of the casing. The longitudinal slot 28 in the selector plate is provided with notches 30 into any one of which the adjusting-arm 26 may be dropped to effect the locking of the horn-carrier in its then position, and out of any one of which the arm may be lifted so as to permit of the transverse movement of the horn-carrier already referred to.

The partition 4 of the casing at or near its front has as explained a transverse slot, 28, and at or near its back has a circular opening 31, which is circumferentially grooved or flanged, as at 32, so as to form a receiving seat within which is adapted to be placed and temporarily secured what I call a record-carrying-ring 33, to which is connected, a diametrically disposed driving shaft 34 removably mounted in two bearings 35, 36 upon said carrying ring. Upon this driving shaft are mounted in a manner later explained, and revoluble with it, any desired plurality of records 37, which, as will be understood from the drawings, occupy, when in position, adjacent parallel vertical planes, are apart the distance of the width of the sound box and extend through the circular opening 31 in the partition so as to be partly within the upper compartment and partly within the lower compartment of the casing. The sound box 5 itself when in place to play occupies a vertical plane parallel with the planes of the records, so that its stylus 6 extends horizontally, as best shown in Fig. 1. It is obvious, therefore, that in order to make use of a single sound box common to all of the records, for the playing of any one of the plurality or group of records mounted in parallelism, it must be possible to place the sound box at the will of the operator between any two selected records—or against the outside playing face of the outermost of the series,—so that it may be made available for use with any one or all of said records of said group. This disposition of the single sound box common to any one of the plurality of records and relatively to any selected one record, is accomplished, first, by means for lifting the sound box clear of the upper peripheries of all the records, so that it can be moved laterally,—second, by means for moving it transversely or laterally with respect to the plurality of records and above all of them,—and, third, by means for draft-

ing it into playing position with respect to the selected record. I find a convenient means for enabling me to effect these three movements to be the following:—It being understood that the tone arm 7 is capable of a laterally swinging movement by the rotation of its hollow inner bushing 8 within the hollow outer carrying-bushing 8*, and that the latter bushing is capable of a rotary movement within the hollow boxing 10 of the upper elbow 11,—it will be further understood that the sound box and tone arm can be lifted and dropped upon the common axis of the bushing 9 and boxing 10 and be also swung laterally on the common axis of the hollow inner bushing 8 and the hollow outer carrying-bushing 8*,—and that, therefore, it is possible to simply take hold of the sound box and lift it above, or drop it between any pair of records, or, when in the dropped position to swing it sidewise in either direction to a distance limited by the propinquity of the records of the given pair. To make it easy to effect these movements of the sound box from the exterior of the cabinet, I attach, conveniently to beneath the outward end of the tone arm, an outwardly-extending sound-box manipulating lever, which I term the selector lever 38, and to which, for convenience, I give the crooked form best shown in Fig. 2. While 38 applies to the entire lever, I have shown it as applied only to the upper crooked or bent-up part of the device, and have designated the outwardly-extending front arm or handle of it as 39, which at its outer end is provided with a preferably weighted thumb knob 40, by which it can be depressed within its slot 41, and be engaged by a lug or catch 42 with which the vertical slots 41 are respectively provided. This front arm 39 may, therefore, at the will of the operator, and by being moved sidewise in the slot 28, be caused to enter and move up and down within any one of a plurality of parallel vertical slots 41 in the selector plate 29 of the casing.

It will now be obvious that the selector lever can be manually operated within the range of the particular slot within which it has been introduced, so as to move up and down within said slot, and so lift or drop the tone arm and sound box, and that it can also, when pushed down, clear the slots and their catches, and be moved sidewise within the slot 28, in consonance with the movement therein of the horn-carrier as effected by its adjusting arm, already described,—and further obvious that the result of this movement of the horn-carrier through its adjusting arm and of the sound box and the tone arm through their common selector lever, will make it possible to introduce a sound box between any two of the plurality of records shown or to the outside of the

right hand of the series of records. The sound box when so introduced between a pair of records, and lifted so that its stylus comes in line with the beginning end of the tone groove of the record to be played, must, as is obvious, be held in such position laterally that its stylus will be pressed against the groove to cause it in the rotation of the record to travel through said groove and this maintenance of position and contact I conveniently accomplish by the following device: 58 is a rock shaft rotatable within an extended bearing 59 integral with or attached to the outer carrying bushing 8*, which rock shaft extends inward toward the sound box and in essential parallelism with the tone arm, and at its inner end nearest the sound box is provided with a depending trip 60 which bears against the tone arm 7. To the other or outer end of the rock shaft, that is the one farthest away from the sound box, there is connected with said rock shaft by means of a depending arm 61, a balanced counterweight 62, which being normally out of vertical dependency from the rock shaft, tends to swing inwardly toward the outer bushing 8*, and in so doing, through the intervention of the depending trip, 60, to hold the sound box and its stylus up against the record with the groove of which the stylus is engaged. The counterweight serves also as a fore and aft balance, so to speak, to the sound box, tone arm and selector lever, to counterbalance any tendency to undesired up and down movement of the sound box.

Assuming, now, that the plurality of five records illustrated can be played by a sound box common to them all by its mere adjustment in the manner described. I will now explain a convenient means of mounting and operating the records, and when they happen to be double-faced, of so reversing the position of the series that the grooves upon their opposite sides can also be played.

At each end, the driving shaft 34 extends beyond the bearings 35, 36, on the carrying ring 33 and is conveniently formed with slots or notches 43, 44, which are adapted to catch into and lock with a lug 45 on a motor shaft 46, which is conveniently housed in the bearings 47, 48, and actuated through a driven spur wheel 49, geared by the usual connective mechanism to the motor, which, as explained, is not shown.

Obviously, as there is a notch in each end of the record driving shaft 34 and as these notches are counterpart in dimensions and radial distance from the center of the shaft, and the notch may be in the motor shaft 46—and the lugs 42 on the driving shaft 34,—if the shaft and records as an entirety are together with their carrying ring 33 turned around in or lifted from their flanged seat 32 in the opening 31 of the partition 4,—and this is easily accomplished, for in-

stance, by the tightening or loosening clips 50 controlled by thumb screws 51,—the sound box being first lifted clear of the records,—the entire device can be given a half
 5 turn so as to bring in apposition to the stylus the other side or groove faces of double-faced records, or for the matter of that, of single faced records when two single
 10 faced records are placed in pairs. It is also apparent that the shaft 34 with the records on it can be taken out of the bearings 35, 36, and reversed.

I find the following a convenient means for applying a plurality of records to the
 15 driving shaft 34: 52 is a hollow sleeve adapted to be fitted over the driving shaft 34 and connected with it at one end by a collar 53, being a part of or on the sleeve, which is
 20 locked by a set screw 54 to the shaft. 56 is a plurality of clamping hubs, as I call them, which are separate spools so to speak, having radially extending clamping faces 57, and which, as a group, are adapted to be
 25 slipped on the sleeve 52 from the left to the right, as shown in Fig. 4, the records which are hollow centered and whether single or
 30 double being slipped on between the faces of the hubs, as shown by the drawings, and which when the entire assemblage of hubs
 35 and records has been put upon the sleeve and closed up to the right, may be locked by the lock nut 55 which is threaded upon the
 40 left hand extended and threaded end of the hollow sleeve 52. Obviously, it is a question
 45 of the length of the driving shaft and sleeve and the width of the casing as to the number of records which can be applied and played
 50 in a machine.

Having now described a convenient construction typically embodying my invention,
 40 its operation so far as not already explained, will be easily understood. When the selected plurality and size of records, depending solely upon the dimensions of the machine as an entirety, have been put in place,
 45 the motor is started to occasion the rotation of the driving shaft 34 which carries the records, all of which are rotated, although one of which only can at one time be played.
 50 The operator, first, makes the desired lateral adjustment of the horn-carrier and its adjuncts including the sound box, by the lateral adjustment of the adjusting arm 26 after its release from the notch within which
 55 it happens then to be,—this selection having been made from a key or index of numbers corresponding to a numbered slot on the selector plate; the operator then selects the then appropriately placed selector lever,
 60 which normally is in the position shown in Fig. 2, and depresses it with the result of raising the sound box to a position in which its stylus will be adapted to enter the beginning of the tone groove of the selected
 65 record. When in this position, the opera-

tion of the counterweight, rock shaft and depending trip, will retain the stylus in the groove of the then traveling record, which will continue to rotate and be played until
 70 the operation of the sound box and stylus are stopped by the encounter of the front arm of the selector lever with the top of the slot 41 within which the lever then is. The
 75 movement of the sound box and the horn-carrier and its adjuncts with respect to the positioning of the sound box with relation to the selected record has already been described.

It will now be understood that I have devised a novel and useful construction which
 80 is adapted to carry out the objects of my invention as I have explained them, and while the embodiment which I have shown and described is one that is both desirable and satisfactory, it is to be understood that it is
 85 susceptible of modification in various details without departing from the spirit or scope of the invention or sacrificing any of its advantages.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A sound-reproducing machine of the character stated, which comprises in combination,—a casing,—a group of revoluble
 90 records disposed in adjacent parallel planes and in removable adjustment upon a common axis of rotation,—a motive mechanism for occasioning the rotation of the common
 95 axis of the records of said group so as to occasion the simultaneous rotation of all of the records,—a sound box common to all of the records of the group supported upon one end
 100 of a tone arm the other end of which terminates in a sound horn,—means for placing the stylus of the sound box against the tone-grooved face of any one of said records,—and a manually operated lever connected with the tone arm and sound horn for
 105 effecting said placement.

2. A sound-reproducing machine of the character stated, which comprises in combination,—a casing,—a group of revoluble
 110 records disposed in adjacent parallel planes and in removable adjustment upon a common axis of rotation,—a motive mechanism for occasioning the rotation of the common
 115 axis of the records of said group so as to occasion the simultaneous rotation of all of the records,—a sound box common to all of the records of the group supported upon one
 120 end of a tone arm the other end of which terminates in a sound horn,—a compound connection between the tone arm and the horn which permits of both the vertical and
 125 the horizontal movement of the sound box without affecting the movement of the horn,—means for placing the stylus of the sound box against the tone-grooved face of any one of said records,—a manually op-
 130

erated lever for effecting said placement,—and means for occasioning the transverse travel of the sound box, tone arm, horn, and manually operated lever.

5 3. A sound-reproducing machine of the character stated, which comprises in combination,—a casing,—a group of revoluble records disposed in adjacent parallel planes and in removable adjustment upon a common axis of rotation,—a motive mechanism for occasioning the rotation of the common axis of the records of said group so as to occasion the simultaneous rotation of all of the records,—a sound box common to all of the records of the group supported upon one end of a tone arm the other end of which terminates in a sound horn,—means for together moving the connected sound box, tone arm and horn,—and means for raising and lowering the sound box so as to place its stylus against the tone-grooved face of any one of the records.

4. A sound-reproducing machine of the character stated, which comprises in combination,—a casing,—a group of revoluble records disposed in adjacent parallel planes and in removable adjustment upon a common axis of rotation,—a motive mechanism for occasioning the rotation of the common axis of the records of said group so as to occasion the simultaneous rotation of all of the records,—a sound box common to all of the records of the group and supported upon one end of a tone arm the other end of which terminates in a sound horn,—means for placing the stylus of said sound box against the tone-grooved face of any one of said records,—and a manually operated lever operating through slots in the casing for effecting the placement of the sound box.

5. A sound-reproducing machine of the character stated, which comprises in combination,—a group of revoluble records disposed in adjacent parallel planes,—means for occasioning the simultaneous rotation of all of the records of said group,—a combined sound box, tone arm and horn, common to all of the records of the group,—a reversely disposed amplifier within the casing of the machine,—and a means for controlling the movement of the sound box, tone arm and the horn referably to both the records and the amplifier.

6. A sound-reproducing machine of the character stated, which comprises in combination,—a cabinet divided into an upper compartment and a lower compartment,—a group of revoluble records disposed in adjacent parallel planes partly within one compartment and partly within the other,—means for occasioning the simultaneous rotation of all of the records of the group,—and a combined sound box, tone arm and horn disposed for lateral movement within the casing, the sound box and tone arm within

the upper compartment and the horn within the lower compartment.

7. A sound-reproducing machine of the character stated, which comprises in combination,—a cabinet divided into an upper compartment and a lower compartment,—a group of revoluble records disposed in adjacent parallel planes partly within one compartment and partly within the other.—means for occasioning the simultaneous rotation of all of the records of the group,—a combined sound box, tone arm and horn disposed for lateral movement within the casing, the sound box and tone arm within the upper compartment and the horn within the lower compartment,—and a reversely disposed amplifier extending across the cabinet, within the breadth of which the horn is adapted to be laterally moved and retained,—and means for effecting the retention of the horn.

8. A sound-reproducing machine of the character stated, which comprises in combination,—a cabinet divided into an upper compartment and a lower compartment,—a group of revoluble records disposed in adjacent parallel planes partly within one compartment and partly within the other,—means for occasioning the simultaneous rotation of all of the records of the group,—a combined sound box, tone arm and horn disposed for lateral movement within the casing, the sound box and tone arm within the upper compartment and the horn within the lower compartment,—a reversely disposed amplifier extending across the cabinet within which the horn is moved,—means for locking the sound box in position between selected records of the group,—and means for moving the sound box and the horn transversely of the casing and locking them in a predetermined position.

9. A sound-reproducing machine, comprising in combination,—a casing divided by a partition into an upper and lower compartment,—a group of revoluble records disposed in adjacent parallel planes upon a common axis of rotation,—means for occasioning the rotary transposition of said group of records so as to transpose the presentation of their tone-grooved faces with relation to a sound box,—a sound box common to all of the records of the group,—and means for placing the stylus of said sound box against the tone-grooved face of any one of said records.

10. A sound-reproducing machine, comprising in combination,—a casing divided by a partition into an upper and lower compartment,—a group of revoluble records disposed in adjacent parallel planes upon a common axis of rotation,—means for occasioning the rotary transposition of said group of records so as to transpose the presentation of their tone-grooved faces with

relation to a sound-box,—a sound box common to all of the records of the group supported upon one end of a tone arm the other end of which terminates in a sound horn,—
 5 and means for placing the stylus of said sound box against the tone-grooved face of any one of said records.

11. A sound-reproducing machine comprising in combination,—a casing divided
 10 by a partition into an upper and lower compartment,—a group of revoluble records disposed in adjacent parallel planes upon a common axis of rotation,—means for occasioning the rotary transposition of said
 15 group of records so as to transpose the presentation of their tone-grooved faces with relation to a sound box,—a sound box common to all of the records of the group supported upon one end of a tone arm the other
 20 end of which terminates in a sound horn,—a compound connection between the tone-arm and the horn which permits of both the vertical and the horizontal movement of the sound box,—and means for placing the
 25 stylus of said sound box against the tone-grooved face of any one of said records.

12. A sound-reproducing machine, which comprises in combination,—a casing divided

by a partition into an upper and a lower compartment,—a group of revoluble records 30 disposed in adjacent parallel planes and in removable adjustment upon a common axis of rotation which is mounted upon the partition which divides the casing into two compartments by an axis,—carrying means 35 capable of a semi-circular rotary movement to a fixed position,—means for retaining said axis-carrying means in either of its two positions,—a sound box common to all of the records of the group supported upon 40 one end of a tone arm the other end of which terminates in a sound horn,—means for placing the stylus of said sound box against the tone-grooved face of any one of said records,—means for laterally moving the sound 45 box and horn,—and means for raising and lowering the sound box so as to place its stylus against the tone-grooved face of any one of the records.

In testimony that I claim the foregoing as 50 my invention, I have hereunto signed my name this 18th day of April, 1916.

MAX KRAUSS.

In the presence of—

J. BONSALE TAYLOR,

JOHN A. WIEDERSHEIM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND TRANSMITTING DEVICE,
#1,199,196-----C.W.McGonigle,
Patented-Sept. 26th, 1916.
Filed-Oct. 4th, 1913.

C. W. McGONIGLE.
SOUND TRANSMITTING DEVICE.
APPLICATION FILED OCT. 4, 1913,

1,199,196.

Patented Sept. 26, 1916.

Fig. 1.

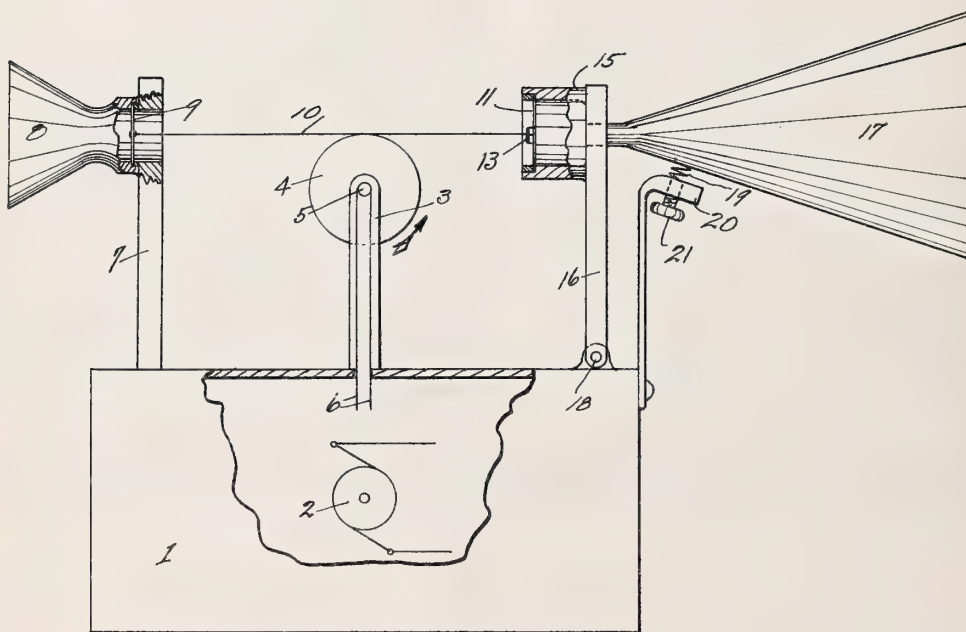
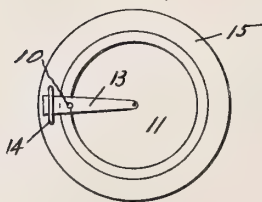


Fig. 2.



WITNESSES:
Frank H. Fowler
Francis L. Fowler.

Inventor
Chas. W. McGonigle
By Fred P. Form
Attorney

UNITED STATES PATENT OFFICE.

CHARLES W. MCGONIGLE, OF SEATTLE, WASHINGTON, ASSIGNOR TO UNIVERSAL HIGH POWER TELEPHONE COMPANY, OF KING COUNTY, WASHINGTON.

SOUND-TRANSMITTING DEVICE.

1,199,196.

Specification of Letters Patent. Patented Sept. 26, 1916.

Application filed October 4, 1913. Serial No. 793,462.

To all whom it may concern:

Be it known that I, CHARLES W. MCGONIGLE, a citizen of the United States, and a resident of Seattle, county of King, State of Washington, have invented certain new and useful Improvements in Sound-Transmitting Devices, of which the following is a specification.

This invention relates to sound transmitting devices and has for its principal object to provide novel and peculiar means to render more effective the operation of a diaphragm or its equivalent in the process of reproducing or transmitting sound, than has heretofore been known to the art so far as I am aware.

The invention will be more fully described in the following specification, illustrated in the accompanying drawings and pointed out in the appended claim.

In the drawings Figure 1 is a side elevation of my device, with parts broken away. Fig. 2 is an enlarged detail end elevation of the receiving diaphragm and its associated parts.

Referring now more particularly to the drawings, reference numeral 1 designates a box-like container within which is a motor 2, which in this instance is of the electrical type, but any other suitable form such as a spring motor or the like may be used, as convenience may suggest; it being understood that I do not confine myself to any particular form of motor.

3 indicates a support which is rigid with the container 1, and revolvably mounted upon which is a drum 4, around the spindle 5 of which passes a driving belt 6 which is adapted to be operatively connected to the motor 2.

Rigid with the container 1 is the support 7, to the upper end of which is affixed a mouthpiece 8 to the center of whose diaphragm 9 is secured one end of a flexible member 10, such as a stout fish twine, piano wire or the like, which extends toward the right, as viewed in Fig. 1, and is passed around the drum 4 and continues on and has its opposite end secured to a lever 13 which is pivoted at 14 to the frame 15 of the diaphragm 11. The extreme right hand end of said lever, as viewed in Fig. 2, is secured to the center of the diaphragm 11 and it will be noted that the cord 10 is secured to

the said lever considerably nearer to the pivot 14 than to the point where the said lever is secured to the said diaphragm, so that a pull on the cord will cause a multiplied movement of the end of the lever which is attached to the diaphragm. The frame 15 of the diaphragm 11 is secured to the upper end of a support 16, from which extends a horn 17, which may be of the construction of an ordinary megaphone. The interior of the said horn communicates with the space within the frame 15 which is behind the diaphragm 11, so that the vibrations of the latter are communicated to the interior of the horn. The lower end of the support 16 is pivoted, at 18, to the container 1 and the horn 17 is yieldingly held in the position shown by means of the spring 19 one end of which bears against the said horn and its opposite end against the screw 21 which passes through the bracket 20, rigid with the container 1, and by means of which the tension of the said spring may be varied to suit conditions, as will be understood.

The diaphragm 11 is normally under tension, that is to say, it bellies out in the direction of the diaphragm 9, the friction between the drum 4 and the flexible member 10 constantly acting to hold the diaphragm 11 in that position as the said drum is turned in an anti-clockwise direction as viewed in Fig. 1. The diaphragm 9 is normally at rest as the rotation of said drum constantly tends to produce slack in that portion of the cord 10 which is between the diaphragm 9 and the said drum. When sound waves are set up within the mouthpiece 8 the diaphragm 9 swells in the direction of the other diaphragm and causes friction between the drum 14 and that portion of the cord which is passed around the drum, to decrease, which permits the lever 13 to move about its pivot and in the direction of the horn 17 under the influence of the tension of the diaphragm 11 and the inertia of the lever 13 vibration being much greater than that of the diaphragm 9, which results in an amplification of the sound through the horn 17. The vibration of the diaphragm 11 is, of course, so rapid that the inertia of the horn is not overcome and the same remains held in its position as seen in Fig. 1. After the diaphragm 11 has moved to its extreme position toward the

right, as just described, it is immediately drawn in the opposite direction a much greater distance than it would be as the result of the inherent spring of the diaphragm itself, due to the lever 13 and the cord 10 between which and the drum 14 the friction is now sufficient to hold the cord 10 to the drum while the latter rotates, and the diaphragm 9 of course meanwhile is returning to normal and taking up the slack in the cord 10 which is between the said diaphragm and the drum. The action is therefore of a winch-like nature, the diaphragm 9 serving to take up the slack while the winch action of the drum 4 draws upon the cord 10.

I have shown a particular form of embodiment of my invention but I am aware that many structural changes therein will readily suggest themselves to others without departing from the spirit and scope of my invention, and I do not desire to be limited to the exact form described.

What I claim is:

In a sound amplifying device, a box shaped container, a rigid horn support at one end and a pivoted horn support at the opposite end of said container, horns each having a diaphragm suitably secured upon said supports, a rigid drum support intermediate said horn supports, a drum revolvably mounted on said support, means for revolving said drum, a lever pivotally mounted upon the pivotally mounted horn and connected to the center of the diaphragm of the said horn, and a flexible member having one end connected to the diaphragm of the horn secured on the rigid support and extending around the revolvable drum and having its opposite end connected to said lever, as and for the purpose set forth.

CHARLES W. McGONIGLE.

Witnesses:

F. P. GORIN,

R. D. SMALLEY.

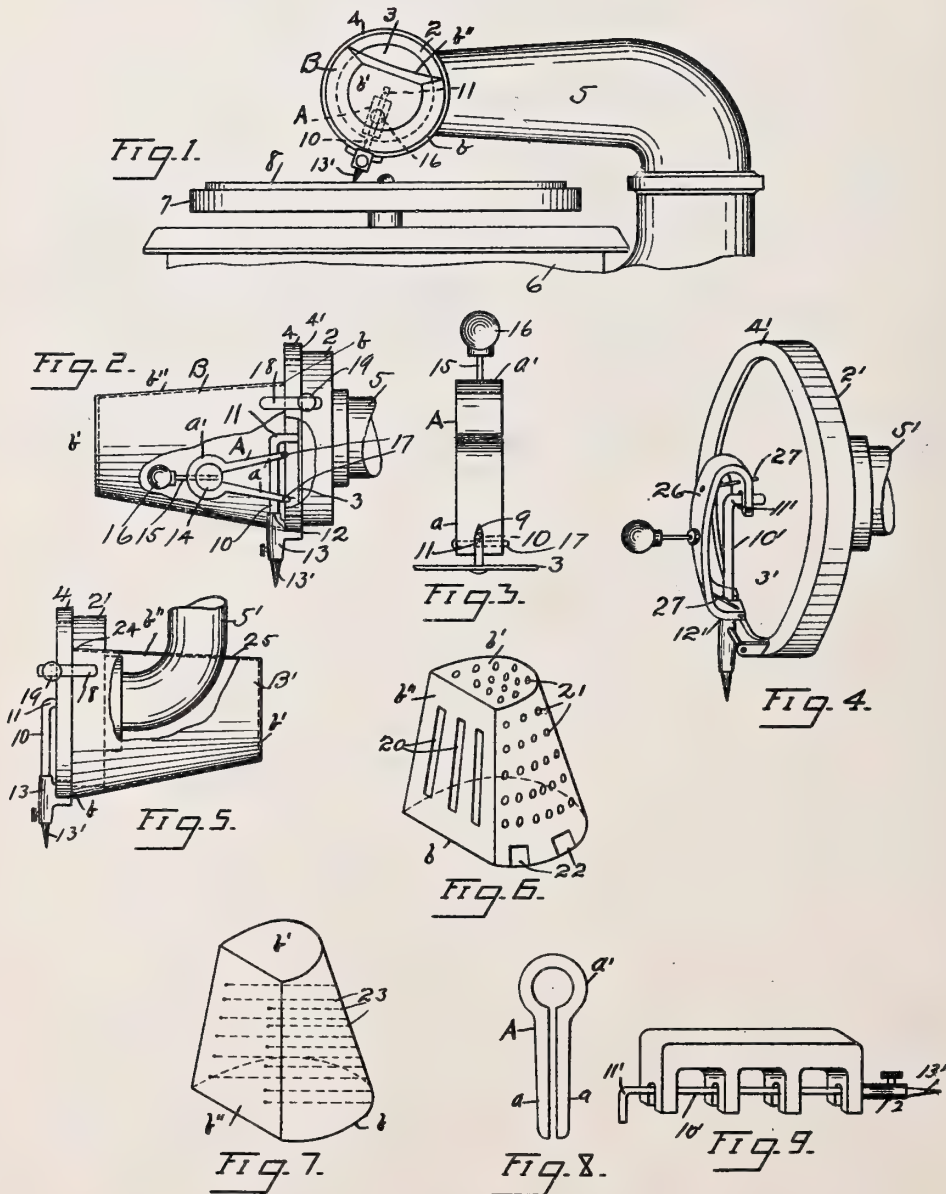
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TONE PURIFIER FOR TALKING MACHINES,
#1,199,197-----C. P. MARSHALL,
Patented-Sept. 26th, 1916.
Filed-August 31st, 1915.

C. P. MARSHALL.
TONE PURIFIER FOR TALKING MACHINES.
APPLICATION FILED AUG. 31, 1915.

1,199,197.

Patented Sept. 26, 1916.



WITNESS
Walter L. Fey

INVENTOR.
CHARLES P. MARSHALL
BY *Harry D. Wallace*
ATTORNEY.

UNITED STATES PATENT OFFICE.

CHARLES P. MARSHALL, OF WATERTOWN, NEW YORK.

— TONE-PURIFIER FOR TALKING-MACHINES. —

1,199,197.

Specification of Letters Patent.

Patented Sept. 26, 1916.

Application filed August 31, 1915. Serial No. 48,320.

To all whom it may concern:

Be it known that I, CHARLES P. MARSHALL, a citizen of the United States, residing at Watertown, in the county of Jefferson and State of New York, have invented certain new and useful Improvements in Tone-Purifiers for Talking-Machines, of which the following is a specification.

This invention relates to means for purifying the tones of phonographs, talking-machines, and like musical instruments, and the invention relates particularly to a combined tone purifier comprising a damping device for attachment to the vibration bar, and a bell for partially or wholly covering or inclosing the reproducer, of such instruments.

The object of the invention is to improve the quality of the tones of talking-machines, phonographs and the like, and to render them clearer, truer, purer and more natural than heretofore.

A particular object of the invention is to improve the means shown and described in my pending application, Serial No. 22709, filed April 20, 1915.

The various features and parts of the invention will be understood from the detailed description which follows, and by reference to the accompanying drawing which forms a part of the specification, in which—

Figure 1 is an elevational view of the reproducing parts of a talking-machine; showing my combined tone purifier applied thereto. Fig. 2 is an enlarged elevational view; partially in section, of the same. Fig. 3 is an enlarged view of one form of the damping part, which is applied to the vibration-bar of the reproducer. Fig. 4 is a perspective view; showing a modified form of the damping part. Fig. 5 is an elevational view, partially in section; showing the bell applied to the back of the transmitter. Fig. 6 is a modified view of the bell. Fig. 7 is still another modified view of the bell. Fig. 8 is another detailed view of the rubber damping part. Fig. 9 is a view of a modified form of the damping part.

In the drawing, 2 represents the hollow case of the reproducer or transmitter, in which is disposed the usual diaphragm 3, the latter being held in place by a ring-cap 4. The reproducer is mounted upon the usual hollow sound-arm 5, which is supported by the box or cabinet 6.

7 represents the revolving support for the

record disk 8, the former being rotatably mounted upon the cabinet 6 in the usual manner.

My tone modifiers or purifiers relate entirely to attachments which are applied to the reproducers of talking-machines of various kinds, and comprise two parts, A and B, which coöperate for subduing the discordant "noise" of the fundamental note of the diaphragm, and also of the vibration-bar, and at the same time, adding a new tone to the reproducer, which tends to cover up the excess of the said "noises" not otherwise subdued. The "noises" referred to, it may be explained, are not a part of the music transmitted from the record, but are harsh and grating notes which are given off by the diaphragm and vibration-bar, when these parts are vibrated by the contact of the needle with the revolving record-disk.

The part A consists of a piece of rubber or other suitable material, preferably soft and flexible, like the material of an eraser or rubber band, which is preferably forked, as shown in Figs. 2 and 8. The free ends of the arms *a* are slotted, as at 9, to receive or straddle the vibration-bar 10, or preferably that portion of the said bar, which extends between the elbow 11 and a shoulder 12 of the support 13 which holds the needle 13'. Fig. 8 shows the rubber part A before it is applied to the vibration-bar. When applying the part A to the bar 10, a part 14 is inserted in the looped or closed end *a'* of the said part, for spreading the arms *a*. The loop *a'* constitutes a spring, the tension of which holds the wedge 14 in place. Under certain conditions, the loop *a'* and the wedge 14 are pierced by a slender rod 15, which extends beyond the loop and its upper end supports a ball or weight 16, which may be solid or hollow, according to the amount of weight required.

The part A is held upon the vibration-bar by means of screws or bolts 17, which pierce the slotted ends of the arms *a*. The rubber part may be made to different forms, and may be applied to the vibration-bar in various ways, and may or may not have associated with it, the pins and balls, 15 and 16, as shown in Figs. 4 and 9. By disposing the part A upon the vibration-bar, the said part being comprised of soft rubber, or like substance, tends to damp or lessen the amplitude of the vibrations of the said bar, and also subdues any vibratory "noise"

which may be produced by said bar. The length of the part A, as well as the spacing of its arms, and also the contact of said arms with the different portions of the vibration-bar, all tend to restrict the vibrations, and also to subdue the "noise", of said bar, to a greater or lesser extent, and in practice the operator may readily and quickly shift the part A from one position to another for altering, or effecting, the different degrees of modification referred to. The ball 16 and its supporting rod 15 both contribute to the subduing effect of the part A upon the vibration-bar, and its presence or absence can be noticed by a quick ear. The part A does not in any way hinder the bar 10 from performing its intended work, *i. e.* transmitting the vibrations from the needle 13' to the diaphragm 3. The part A, owing to its size, weight and non-vibrative nature, restricts the amplitude of the vibrations of said bar, and in this way prevents, or to a great extent weakens, the "noise" referred to.

The part B of my tone modifier, consists of a truncated cone or bell, preferably hollow and made of metal, but may be made of any other suitable material. The larger end *b* of the bell is open and preferably rests upon the face of the cap 4, as shown in Figs. 1 and 2. The bell is held in place by suitable fastening means, as lugs 18, which are pierced by screws 19, the inner ends of the screws extending beyond and engaging the underside of the over-hanging flange 4' of the cap. Various other fastening means may be employed instead of the parts shown in Figs. 2 and 5. The smaller end *b'* of the bell is preferably closed. In the preferred form of the bell, one side, as *b''* is flattened so as to leave a portion of the diaphragm 3 exposed and also to form an auxiliary diaphragm (see Figs. 1 and 2). The bell B completely incloses or houses in the vibration-bar and the rider A.

In operation the vibrations of the rim of the cap 4 of the reproducer are transmitted to the bell, causing the latter to resound with its own tone or tones, and the latter are taken up to a greater or less extent by the diaphragm and are heard in the music or reproduction from the record. In this way a pleasing tone quality is added to the reproduction, which is rendered still more pleasing to the ear, because the "noises" from the fundamental notes of the diaphragm and vibration-bar are practically overcome or covered-up. A difference in the size, weight and material of the bell correspondingly enhances this pleasing effect. The bells B may be made up in many different forms, and may be provided with various tone modifying features, as for example, the slots 20, the perforations 21, and the notches 22, as shown in Fig. 6, as well

as by stringing wires across the interior of the bell, as shown at 23 in Fig. 7. The bell may also be applied to the back of the transmitter, or case 2, as shown at 24 in Fig. 5, for producing a still different modified effect. In Fig. 5 the bell A' has a slot 25 in its flat side to receive the sound-tube 5', and it is held in place by the lugs 18 and screws 19.

The rubber part A reduces the amplitude of the vibrations of the bar 10, steadying the latter, and subduing more or less the harsh "noise" of the said bar, which tends to modify or purify the tone of the instrument, and render music more pleasing, and speech and songs clearer and more distinct. The part B by materially overcoming or subduing the "noise" of the diaphragm as described acts in conjunction with the part A, and by reason of its individual tone referred to, adds mellowness, richness and brilliancy, according to its size, shape and substance, which greatly improves the general tone of the instrument as compared with what has heretofore been accomplished.

In Fig. 4 I have shown a modified damping part, comprising a plain flat strip of rubber 26, the opposite ends of which are slotted for straddling the vibration-bar 10' adjacent the shoulder 12' and also between the elbow 11' and the diaphragm 3'. The curved ends of the part 26 are held in position by bolts or pins 27. By this disposition and arrangement of the part 26, the amplitude of the vibrations of the bar 10' is greater, and the tone of the instrument is less smooth and clear, than in Fig. 2. This part is applicable to short types of bells.

Fig. 9 illustrates a modified form of the elastic damping part, which consists of an elongated body preferably extending nearly the full length of the vibration bar 10' and having a plurality of feet or legs resembling a centipede, which are slotted to receive and grip the said bar at frequent intervals between the elbow 11' and the shoulder of part 12. By the use of this damping part, the vibration bar is divided into a number of relatively short free or exposed portions which extend between the legs and these portions vibrate somewhat freely, but owing to the comparatively close spacing of the legs, the amplitude of the vibrations is not very great and therefore offers little disturbance during the reproductions.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a talking machine having a diaphragm, a vibration-bar, an open casing for supporting said parts, and an open bell mounted upon the face of said casing and covering said diaphragm and said bar, and means for securing said bell with the rim of said casing.

2. In a tone modifier for talking machines, the combination with the diaphragm and its supporting case, said case having an open face surrounded by an annular flange, of a bell adapted to be mounted upon said annular flange and overlying said diaphragm, one end of said bell having a clear opening facing the diaphragm, and means for securing said bell to said flange.

3. In a tone modifier, the combination with the diaphragm and its supporting case, said casing having an annular portion extending beyond the diaphragm, of a hollow truncated cone having one open end and one closed end adapted to be mounted upon the annular portion of said casing and overlying said diaphragm, the open end of said cone facing the diaphragm and one side thereof flattened for exposing a portion of the diaphragm.

4. In a tone purifier, the combination with the reproducer of a talking machine comprising the open casing, the diaphragm, and the vibration-bar, of a hollow truncated cone mounted upon the open face of the casing, inclosing said vibration-bar and partially covering said diaphragm, the end of said cone facing the diaphragm having a clear opening, and means comprising a plurality of lugs and screws for securing said cone to the casing.

5. A tone purifier for talking machines, comprising a bell-shaped resonator having a clear open mouth mounted over the face of

the transmitter and partially inclosing the reproducing diaphragm, and means for adjustably securing the said resonator to the transmitter.

6. A tone purifier for talking machines, comprising a hollow truncated cone mounted upon the frame of the reproducer and partially concealing the reproducing diaphragm, the said cone having a clear opening facing the diaphragm and having one flat side which acts as a sounding-board for modifying the "noise" of the diaphragm.

7. A tone purifier for talking machines, comprising a hollow resonator mounted upon the reproducing transmitter and partially over-lying the exposed face of the reproducing diaphragm for subduing the "noise" of the said diaphragm, said resonator having an open end facing the diaphragm and having one flat side which acts as a sounding-board.

8. A sound rectifier for talking machines, comprising a hollow bell-shaped resonator having one open end, the opening in said end being unrestricted, said open end closely contacting with the rim of the reproducing transmitter and inclosing the diaphragm and also the vibration-bar which vibrates the said diaphragm, the said resonator having one flat side which acts as an auxiliary sounding-board, and means engaging said rim for holding the resonator in place.

In testimony whereof I affix my signature.

CHARLES P. MARSHALL.

SCRATCH MUFFLER FOR SOUND REPRODUCING
MACHINES,

#1,199,206-----A. C. Rutzen,
Patented-Sept. 26th, 1916.
Filed-June 4th, 1915.

A. C. RUTZEN.
 SCRATCH MUFFLER FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED JUNE 4, 1915.

1,199,206.

Patented Sept. 26, 1916.
 2 SHEETS—SHEET 1.

Fig. 1

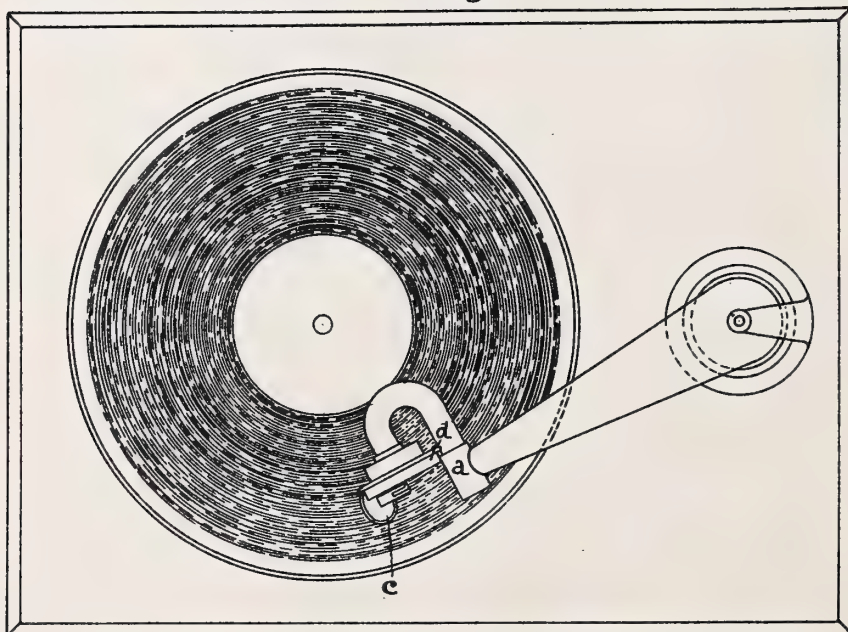
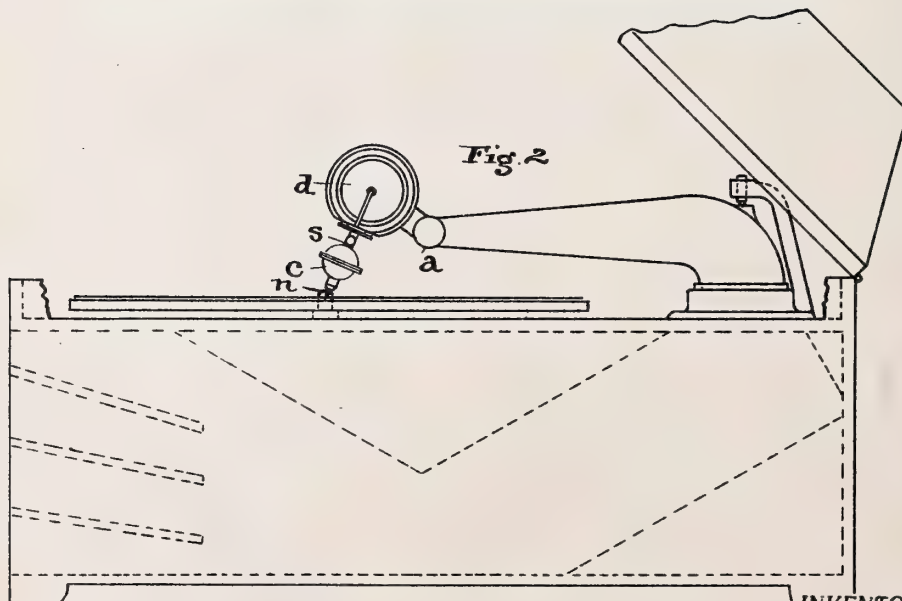


Fig. 2



WITNESS
H. H. George.

INVENTOR.
 A. C. RUTZEN.
 BY *Fisher & Moore*
 ATTORNEYS.

A. C. RUTZEN.
 SCRATCH MUFFLER FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED JUNE 4, 1915.

1,199,206.

Patented Sept. 26, 1916.

2 SHEETS—SHEET 2.

Fig. 3.



Fig. 4.

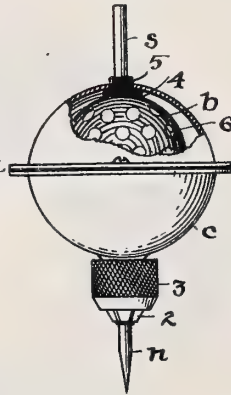


Fig. 5.

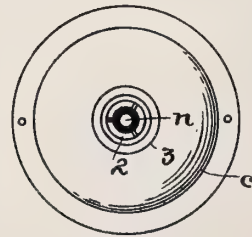


Fig. 6.

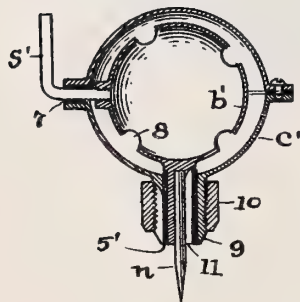


Fig. 7.

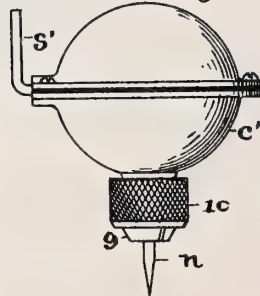


Fig. 8.

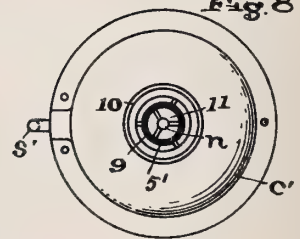


Fig. 9.

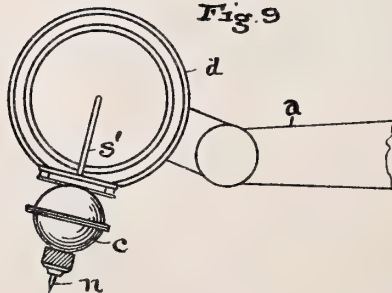
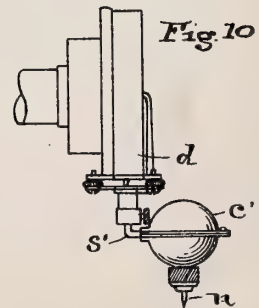


Fig. 10.



WITNESS
H. H. George.

INVENTOR.
A.C. RUTZEN.
 BY *Fisher & Weaver*
 ATTORNEYS.

UNITED STATES PATENT OFFICE.

AUGUST C. RUTZEN, OF CLEVELAND, OHIO.

SCRATCH-MUFFLER FOR SOUND-REPRODUCING MACHINES.

1,199,206.

Specification of Letters Patent. Patented Sept. 26, 1916.

Application filed June 4, 1915. Serial No. 32,097.

To all whom it may concern:

Be it known that I, AUGUST C. RUTZEN, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Scratch-Mufflers for Sound-Reproducing Machines, of which the following is a specification.

My invention pertains to a scratch muffler for sound reproducing machines, such as the Victor, the Columbia, and other like machines of the gramophone type, and which is intended to prevent, deaden or eliminate the scratchy sound or noise common to such machines as now generally in use.

In the accompanying drawings, Figure 1 is a plan view of a gramophone of a well known kind and Fig. 2 is a side elevation thereof and both views equipped with my muffler attachment. Fig. 3, Sheet 2, is a sectional elevation of the said attachment or muffler in one of its forms, and Fig. 4 is a side elevation thereof and Fig. 5 is a plan view. Fig. 6 is a sectional elevation of a modification of the muffler attachment and Figs. 7 and 8 are a side elevation and plan view thereof respectively. Fig. 9 shows a section of an arm of the machine with the sound box and my attachment thereon and Fig. 10 is an elevation of the parts seen in Fig. 9 but at right angles thereto.

It is well known to all who are familiar with musical or other mechanical reproductions by gramophone and like machines that there is an audible scratchy or raspy noise or sound incident to the operation which grates on sensitive ears and greatly detracts from the enjoyment which would otherwise be obtained and which such machines are expected to afford. The present invention, therefore, is designed to remedy this fundamental imperfection in sound reproducing machines and to make the machine reproduce the tones in their original purity and quality. To these ends I have devised the attachment herein set forth and consisting of what I prefer to term a scratch muffler, the purpose and effect being to absolutely prevent or deaden the scratchy noise at least to such an extent that it cannot be detected by the human ear if it be not totally eliminated, which I believe it is. At any rate with the use of my attachment no scratch or noise of that kind can be heard in the presence of the legitimate sounds derived from the record. The said muffler or at-

tachment is, therefore, presented at this time in two practical embodiments, and while these differ more or less in mechanical details, they have the same practical effect and value. However, I would not have it understood that the said forms of the invention define its limits either in their construction or in their relation to the needle and other parts. Nor possibly do they represent the best or simplest developments thereof since, in my protracted and widely varied experiments to find a practical scratch muffler, I have made other forms of apparently great promise and which presumably are protected by the generic claims presented herein. Thus, in Fig. 3, the invention is embodied in an attachment in which *n* represents the usual needle of whatever kind or material, and *s* a stem which has a split spring chuck in its bottom in which the needle is removably supported and which practically forms a continuation of the needle and goes to the usual needle holder in connection with the sound box, say as in Fig. 2. The said stem and needle are thus in a sense unified, or made as one element and are supported together in the preferably spherical casing *c*, which has a split externally threaded extension 2 at its bottom and a nut 3 thereon adapted to close the same upon the needle and thus definitely fasten the same with said casing, while the stem *s* has a collar 4 within and bearing against said casing and adapted to prevent thrust of the stem as well as serving as a top bearing for the ball *b* mounted on said stem within the casing. The said ball is shown herein as consisting of rubber, with a hollow core or center and bored through to sleeve upon said stem and whereon it occupies the upper portion of the casing, being relatively smaller than the casing as shown. This leaves an unoccupied space in the casing all around the ball and especially about the bottom and side thereof, and the said ball is provided with uniformly scattered radial bore holes or cavities 6 over its entire surface and which, in this instance, extends approximately two thirds of the distance through the wall or body of the ball.

I have specified rubber as the material shown for the ball *b*, but as to this I wish it to be understood that I can use wood or any other material which will serve the same purpose or have the same or equivalent

operating effect, and neither do I limit myself to the proportionate number of holes 6 nor to their depth, as I might want greater depth, nor to the thickness and proportionate weight of the ball, as some or possibly
 5 all the said holes might penetrate near to or even into the interior of the ball, or fewer or possibly no holes at all might serve with some possible forms of the ball. Indeed my experiments have led me to see
 10 that there are many possible changes in what might seem minor particulars which make a great difference in the results obtained. Also the shape of the casing *c* may
 15 be changed or varied and possibly in some instances it might be perforated more or less for open intercommunication and serve the purpose.

In Fig. 6 I show the other or modified
 20 form of the invention above referred to. In this form I employ a casing or sphere *c'* as above, but the stem *s'* is a right angled member inserted through an insulated nipple 7 at the side of the casing and engaged in or
 25 with the ball *b'* therein. The said ball is of metal rather than rubber and has a comparatively thin shell and is provided with scattered holes or openings 8 which open the interior of the ball into free annular space
 30 about the ball within said shell, and the said shell has a split extension 9 and a nut 10 thereon adapted to clamp and fix the needle *n* within the split extension 11 of the ball after the manner seen in Fig. 3.
 35 This fixes the ball *b'* centrally and rigidly in the casing *c'*. Figs. 9 and 10 show this form of muffler as attached to the box *d* of a machine having a supporting arm *a*.

Now, as respects the theory on which this
 40 invention has been worked out or upon which I obtain the results sought, I can only say that up to this time I have been much more interested in the practical development of a device to do the work than with
 45 any preconceived theories on which the development should proceed. Hence I tried one thing and another and another, and worked from clue to clue in darkness and light until I found that certain constructions or combinations, of which the forms
 50 herein are fairly representative, would do the work. It has, therefore, been less a question of theory about weights or insulations or chambers or other abstractions than
 55 actual experimentation with devices that might possibly serve my purpose. I may say however, that in working up to the structure shown in Fig. 3, the mere addition of the ball *b* to the combination did not give
 60 satisfactory results, but when the said ball was provided with the bore holes 6 I found an instant solution of the problem and all the scratchy sounds disappeared.

Likewise in Fig. 6, the plain imperforate
 65 ball or shell *b'* was wholly unsatisfactory,

but when perforated or provided with openings the effect was magical. Yet in one case the holes do not go to the hollow interior of the ball and in the other they do; the total weight of Fig. 3 is greater than Fig. 6 and,
 70 while there is metallic continuity in both forms through the needle to the sound chamber, the connection is indirect through the shell *b'* in Fig. 6, where a metallic rather than a rubber ball is employed. I do
 75 not, therefore, at this time, undertake to say that a solution of the problem of scratch elimination can be put into any given formula or be limited to any particular instrumentalities, but I do claim that the
 80 means herein shown and described do the work perfectly. A cushioning or insulating medium 5, such as rubber is also used between the casing and the stem *s* and
 85 needle *n*, and also between the flanged halves of the casing, see Fig. 3. In Fig. 6 similar cushioning or insulating material 5' is used between the two halves of the casing and between the two split extensions 9 and 11.

The casing, shell or drum *c* or *c'* shown
 herein is preferably made in two halves or sections and also preferably of metal, and in addition to providing a chamber containing the ball or member *b* or *b'* serves also
 95 as the medium on which the needle and the stem are separately or separably supported. The attachment or article of manufacture shown and claimed is therefore a complete unit without the needle, having a socket or
 100 clamp in which the needle is removably engaged. The stem, however, in the present form of the device may be regarded as a portion of the attachment but is subject to modification to suit the machine to which
 105 it is attached.

What I claim is:

1. A scratch muffler for gramophones and the like comprising a metallic shell, a muffler member, in said shell and insulated
 110 therefrom and a needle engaged with said muffler member and insulated from said shell.
2. A scratch muffler for gramophones and the like comprising a substantially spherical
 115 metallic shell and a hollow muffler member fixed therein and a needle fixed to said member and insulated from said shell.
3. A scratch muffler for gramophones and the like, comprising a metallic shell, a muffler member in said shell supported apart
 120 from the wall thereof and insulated therefrom, and a needle engaged with said member and insulated from said shell.
4. A scratch muffler for gramophones and
 125 the like, comprising a spherical metallic shell, a hollow muffler member in said shell, a needle secured to said member and insulated from said shell and a part physically connected with said member and projecting
 130

through said shell and adapted to be connected with a sound box.

5 5. In machines as described, a device adapted to be interposed between the sound box and the reproducing needle and adapted to subdue the scratchy noise in the needle, the said device comprising two rounded hollow members of different sizes and one within the other.

10 6. In a scratch muffling device as described, outer and inner hollow members fixed apart from each other and provided with a socket for a needle, a needle in said socket and a stem projecting through the
15 outer of said members into the inner member.

20 7. The muffling attachment described having two members one within the other and insulated from each other, a needle in transmitting relations with the said members,

and a stem projecting through the outer of said members into the inner member.

8. A muffling attachment as described comprising a substantially spherical metallic shell and a needle thereon and means
25 separate from said needle to affix the said shell to a sound reproducing machine.

9. A muffling attachment as described having a substantially spherical outer member and a correspondingly shaped inner
30 member and means to transmit the sounds to said parts comprising a needle in fixed relations with both said members.

In testimony whereof I affix my signature in presence of two witnesses.

AUGUST C. RUTZEN.

Witnesses:

GEO. E. KRICKER,
H. T. FISHER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

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The twentieth part of the chapter discusses the importance of the...

DIAPHRAGM,

#1,199,304-----J. Resch,

Patented--September 26th, 1916.

Filed-April 8th, 1915.

J. RESCH.
DIAPHRAGM.
APPLICATION FILED APR. 8, 1915.

1,199,304.

Patented Sept. 26, 1916.

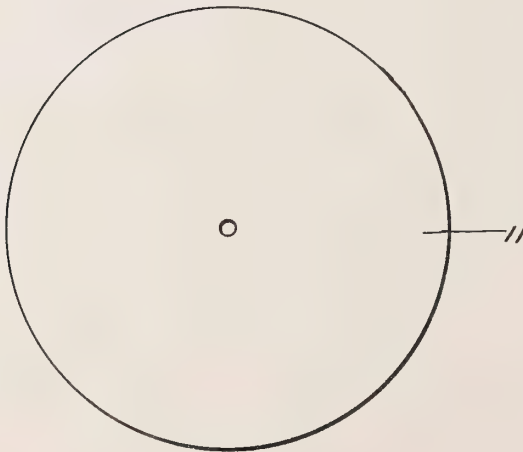
Fig. 1



Fig. 3



Fig. 2



Witnesses:
Alex. Lager
A. M. Pinal

Inventor:
Jacob Resch
By J. V. Whitely
his Attorney

UNITED STATES PATENT OFFICE.

JACOB RESCH, OF MINNEAPOLIS, MINNESOTA.

DIAPHRAGM.

1,199,304.

Specification of Letters Patent.

Patented Sept. 26, 1916.

Application filed April 8, 1915. Serial No. 19,919.

To all whom it may concern:

Be it known that I, JACOB RESCH, a subject of the King of Germany, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Diaphragms, of which the following is a specification.

My invention relates to diaphragms for talking machines, and has for its object to provide a novel and useful diaphragm which shall be possessed of peculiarly efficient and desirable characteristics in the reproduction of sounds from talking machines.

The diaphragms commonly employed are formed of mica or celluloid and in some instances of cardboard in which deposits or layers of metallic fillers have been formed or impregnated after the cardboard has been fabricated. A principal defect of all such diaphragms has been that the sound reproduction has been harsh and metallic, and certain sounds, particularly the high or treble notes of the human voice, have been reproduced in a blasted and unpleasant manner. I have discovered that a diaphragm made in accordance with my invention herein described obviates this defect in the reproduction while very greatly increasing the sound producing qualities of the talking machine.

The invention consists primarily in the formation of a diaphragm from the well known commercial article of manufacture known as trunk fiber by means of the reduction of the thickness of said trunk fiber through scraping, grinding, or polishing.

The so-called trunk fiber is a well known article of commerce formed of wood fiber and silk or other textile fabrics united by a special binder under very great pressure, whereby there is produced a perfectly uniform substance of great hardness, density and toughness which is waterproof, resists the action of moisture in the atmosphere, is non-fracturable, flexible, elastic, and as I have discovered is possessed in a high degree of the capacity for vibration. The uniform

character of this substance makes it possible to reduce the same by grinding, polishing or scraping without affecting the character of the remaining material or of the surface of the reduced diaphragm, differing in this particular wholly from common wood fiber board, which requires a special glazing of the surface put in during manufacture and cannot be cut down through this surface without interfering with the character of the material.

In the drawings illustrating the application of my invention in one form, Figure 1 is a section of a piece of trunk fiber showing the full thickness of the same. Fig. 2 is a plan view of a diaphragm made in accordance with my method therefrom. Fig. 3 is a section through said diaphragm showing its slightly double-concaved form.

The trunk fiber is formed in sheets of a normal thickness of about one-eighth of an inch, which, as above pointed out, is absolutely uniform in character throughout the thickness thereof. This trunk fiber can be scraped, ground, or polished to any desired thickness, and when reduced to a very thin sheet, even much thinner than is desirable for my diaphragm, it still possesses all the qualities of toughness, durability, hardness, and capacity for vibration of the original material.

In producing my diaphragm, I cut from the trunk fiber a circular disk of the proper diameter for use as a diaphragm. Thereafter, by scraping, grinding, or polishing, I reduce the thickness of this disk, as indicated in Fig. 3, rendering the same slightly concave on both sides. Various thicknesses may be employed with different results as to volume and quality of sound. I have found that a thickness of about one-sixty-fourth of an inch produces the greatest volume of sound of the most pleasing quality.

The advantages of my invention are obvious. The diaphragms produced thereby are cheap to construct, extremely strong and

5 durable, do not deteriorate from use or under changing weather conditions, are highly vibratory, and have the quality of receiving and transmitting vibrations in such manner as not to change the timbre of the resulting sound, thereby reproducing instrumental and vocal musical numbers and human speech in a thoroughly natural and pleasing manner.

I claim:

A sound-reproducing diaphragm formed of trunk fiber reduced to a suitable thickness.

In testimony whereof I affix my signature in presence of two witnesses.

JACOB RESCH.

Witnesses:

F. A. WHITELEY,
HARRIET A. CREW.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

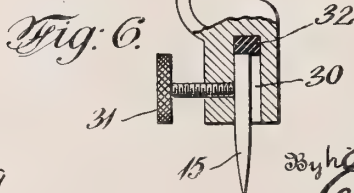
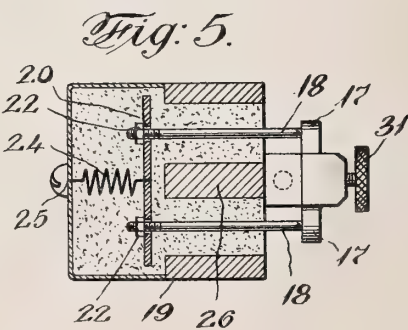
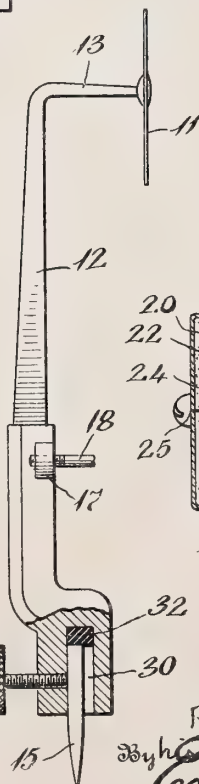
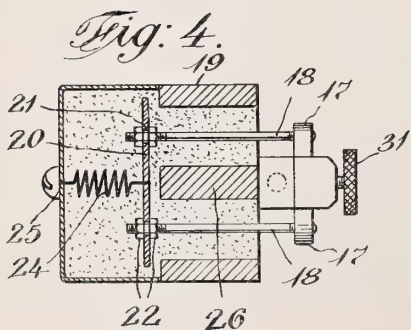
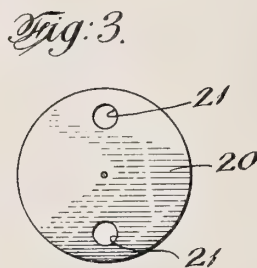
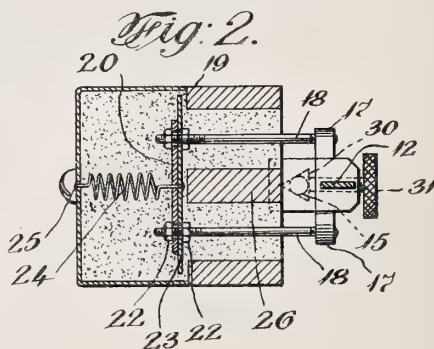
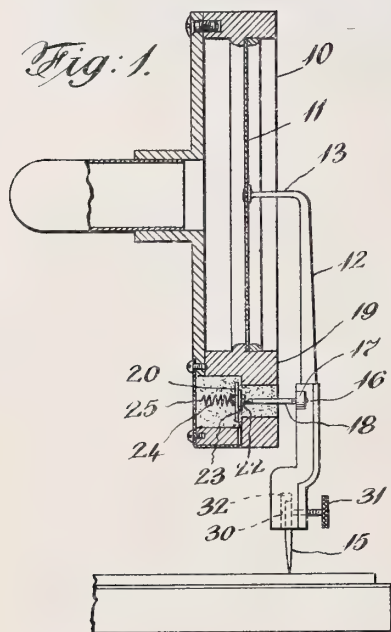
SOUND REPRODUCING AND RECORDING MACHINE,

#1,199,968-----Patrick B. Delany,
Patented-Oct. 3rd, 1916.
Filed-Aug. 22nd, 1914.

P. B. DELANY.
SOUND REPRODUCING AND RECORDING MACHINE.
APPLICATION FILED AUG. 22, 1914.

1,199,968.

Patented Oct. 3, 1916.



Witnesses:
John J. Kittel
L. F. Browning

Patrick B. Delany
By his Attorney
Edward C. Dandane

UNITED STATES PATENT OFFICE.

PATRICK B. DELANY, OF SOUTH ORANGE, NEW JERSEY.

SOUND REPRODUCING AND RECORDING MACHINE.

1,199,968.

Specification of Letters Patent.

Patented Oct. 3, 1916.

Application filed August 22, 1914. Serial No. 858,059.

To all whom it may concern:

Be it known that I, PATRICK B. DELANY, a citizen of the United States, residing at South Orange, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Sound Reproducing and Recording Machines, of which the following is a specification.

This invention relates to talking machines and has particular reference to improvements in the construction of the sound box and its attached mechanism.

One object of the invention is to mount the vibrating arm which actuates the diaphragm so as to prevent the conduction or dissipation of the record vibrations through the mounting to the sound box casing or other parts of the machine.

Another object is to conduct the vibrations caused by the record to the diaphragm without loss or impairment of any kind, thereby overcoming harsh and metallic sounds and improving the quality of the musical tones or vocal utterances, and the behavior of the apparatus in other respects; and still other objects will appear in the following description and claims.

Referring to the drawings: Figure 1 is a side elevation in section of my improved sound box and mechanism; Fig. 2 is a section taken horizontally through the improved mounting for the vibrating arm; Fig. 3 is a face view of the mounting diaphragm; Figs. 4 and 5 are sectional views illustrating modifications of the mounting; and Fig. 6 is a sectional elevation of the stylus bar.

As shown in Fig. 1, a sound box 10 is provided in which is fitted a diaphragm 11. The vibrating arm 12 is attached to the diaphragm 11 by a connection 13, and at the lower end of the arm, a recording or reproducing needle 15 is provided, located in socket 30 and fastened by screw 31.

A fulcrum is provided for the arm 12 at about the point 16. This fulcrum is preferably constructed so that no local vibrations created at this point can make their way to the sound box 10 or diaphragm 11, nor will any of these vibrations react upon the arm 12 to injure the tone or quality of the sound waves transmitted by the diaphragm. While there are many ways of accomplishing this object, in the particular construction shown, the arm 12 is provided with a cross-arm 17, to each extremity of which is attached a support 18. The ends of these sup-

ports project into a chamber or container 19 located beneath the sound box as shown in Fig. 1. Within this container is mounted a metal plate 20 with apertures 21 through which the supports 18, 18 pass. The plate 20 is rigidly secured to the supports 18, 18, preferably by means of nuts 22, 22 screwed upon the threaded ends of the supports 18, 18 and bearing against the sides of the plate 20. The supports are also tied together by the flat bar or yoke 23. Coöperating with the plate 20 and serving to balance the supports 18 is a spring 24 one end of which is attached to the plate 20 or yoke 23 and the other end to the container wall 25. The object of the yoke 23 is to reinforce or stiffen the plate 20, but its use is not absolutely necessary. The mechanism thus described comprises a flexible mounting, or a resilient, universal fulcrum mount, which is adapted to accommodate itself relatively to the diaphragm 11 and its connections therewith so that it adjusts itself to its natural and most efficient position. When this position has been assumed, means are provided to lock the mount in place and provide a permanent setting for the supports 18, 18 which determine the location of the fulcrum. This is done by filling the container 19 with a material made liquid by heat and which in cooling, sets into a mass that prevents any further change in the position of the supports 18, and which is of a character that will, when in a liquid condition, intimately adhere to all parts of the container, the plate and supports with which it contacts, and when set, will check or prevent the transmission of vibrations therethrough. A suitable material for this purpose consists of one part by weight of Stockholm tar, one part by weight of resin and three parts by weight of gutta-percha.

In Fig. 4 a modification of the mounting is shown in which the yoke 23 is dispensed with, and as in the construction described above, the plate 20 is not attached to the walls of the container but floats therein.

In Fig. 5 a modification is shown in which the plate 20 is floating and one set of the nuts 22, 22 is dispensed with; the plate 20 being held in its relative position by the spring 24.

The supports 18—18 extend from arms 17, laterally disposed on the stylus arm, into the container thus insuring more perfect responsive action of the stylus arm

to its rocking influence by elimination of any tendency of the arm to rock or vibrate laterally at its fulcrum point. The comparatively large flat head plate 20 which connects the supports is embedded in a substantially immobile mass which by its molecular structure is adapted to absorb or oppose vibratory motions.

As indicated in Figs. 2, 4 and 5 the container is preferably provided with a partition as shown at 26.

I have discovered further that the rubbing which takes place between the butt end of the needle 15 and the base of the socket 30 is the cause of most of the discordant screeching in reproduction, especially in the lower tones when the vibrations of the needle are wide and powerful. It is advisable, however, that there be a fixed limit for the insertion of the needle, so that each needle is clamped in the socket at the same depth. I maintain such a limit and at the same time eliminate the objectionable rubbing by providing the bottom of the socket 30 with a suitable plug 32 of vibration insulation, such as rubber, leather, cork, or other suitable material, this plug preventing contact between the end of the needle and the bottom of the socket. The volume or pitch of the reproduction are in no way modified, but the rasping noises are eliminated.

I claim:—

1. In combination, a sound box and diaphragm, an actuating arm attached to the diaphragm, a container, an arm supporting plate within the container, a plurality of supporting rods connecting the plate with the arm, means to adjust the plate within the container relatively to the diaphragm, and material inert to vibrations adapted to hold the plate permanently within the container in a given position said material being cast in the container and about the supports.

2. In combination, a sound box and diaphragm, an actuating arm attached to the diaphragm, a plurality of supports for the arm, a partitioned container adapted to

receive the supports, and a hardened or set plastic mass located in the container for securing the supports therein.

3. In combination, a sound box and diaphragm, an actuating arm attached to the diaphragm, supports for the arm, a container equipped with a partition at the open side thereof, the said arm supports extending into the container with the partition between them, and terminating in a head plate larger than the openings at the sides of the partition, and means for holding the said supports with relation to the container and partition.

4. In combination, a sound box and diaphragm, an actuating arm attached to the diaphragm, a container, an arm supporting plate within the container, supporting rods for the arm extending into the container and attached to the plate, resilient means connecting the plate and the container, and a fusible material for filling the container and holding the plate therein.

5. In combination, a sound box and diaphragm, an actuating arm attached to the diaphragm and having lateral projections, supporting rods for the arm extending from the lateral projections and having an enlarged head plate, a container for the head plate, means for adjusting the head plate on the rods, and means comprising a material adapted to be fused and to harden on cooling to fix said plate in its adjusted position.

6. In combination, a sound box and diaphragm, a needle-actuating arm attached to the diaphragm, a plurality of supports for the arm, a container, and material inert to vibrations adapted to hold the supports permanently within the container in a given position which material is cast in the container about the supports.

In testimony whereof, I have hereunto subscribed my name.

PATRICK B. DELANY.

Witnesses:

ANNIE M. DELANY,
A. P. RITENOUR.

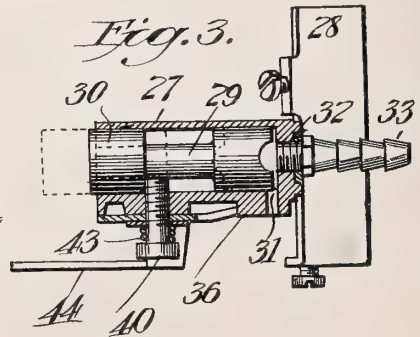
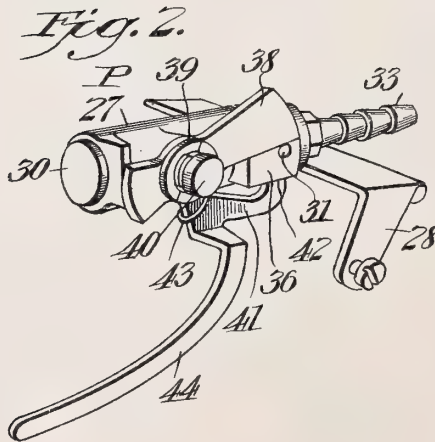
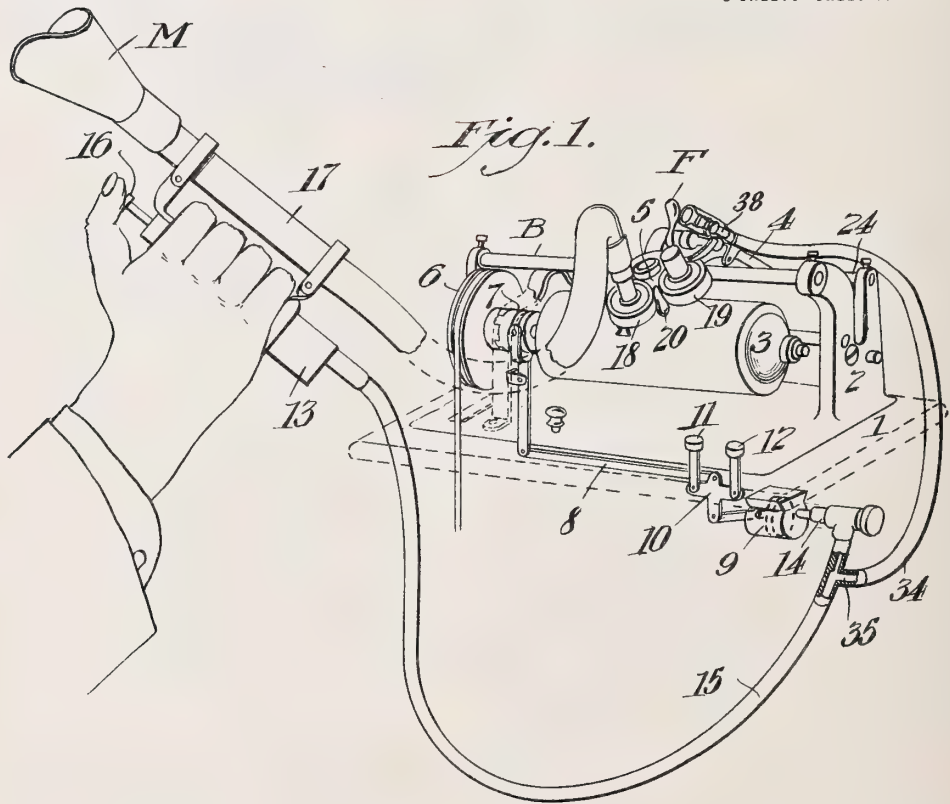
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

CONTROL ATTACHMENT FOR DICTATING-PHONOGRAPHS,
#1,200,100-----Ralph B. Goodrich,
Patented-October 3rd, 1916.
Filed-July 29th, 1915.

R. B. GOODRICH.
 CONTROL ATTACHMENT FOR DICTATING PHONOGRAPHS.
 APPLICATION FILED JULY 29, 1915.

1,200,100.

Patented Oct. 3, 1916.
 3 SHEETS—SHEET 1.



Witness
T. L. Mocher

By

Inventor
Ralph B. Goodrich
S. W. Whang
 his Attorney

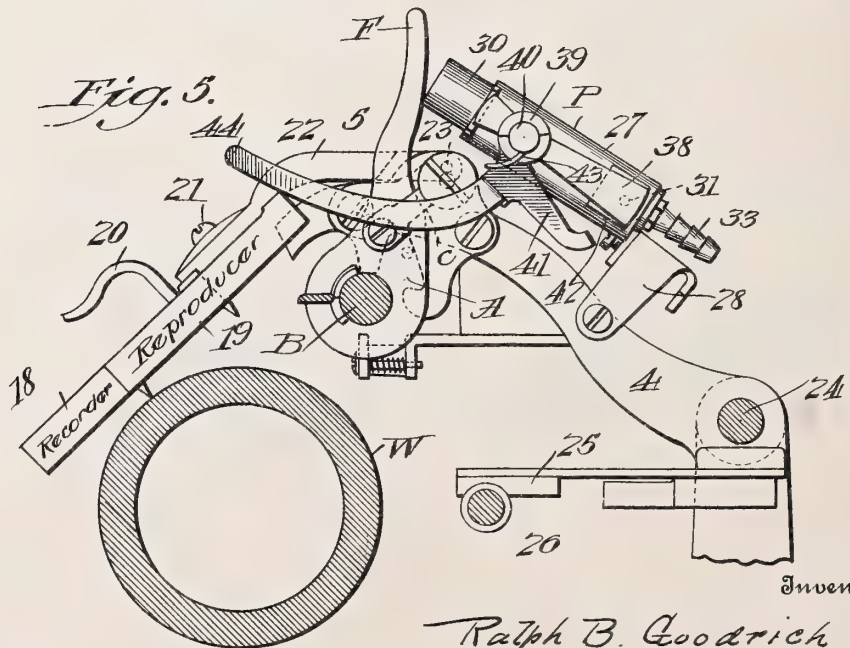
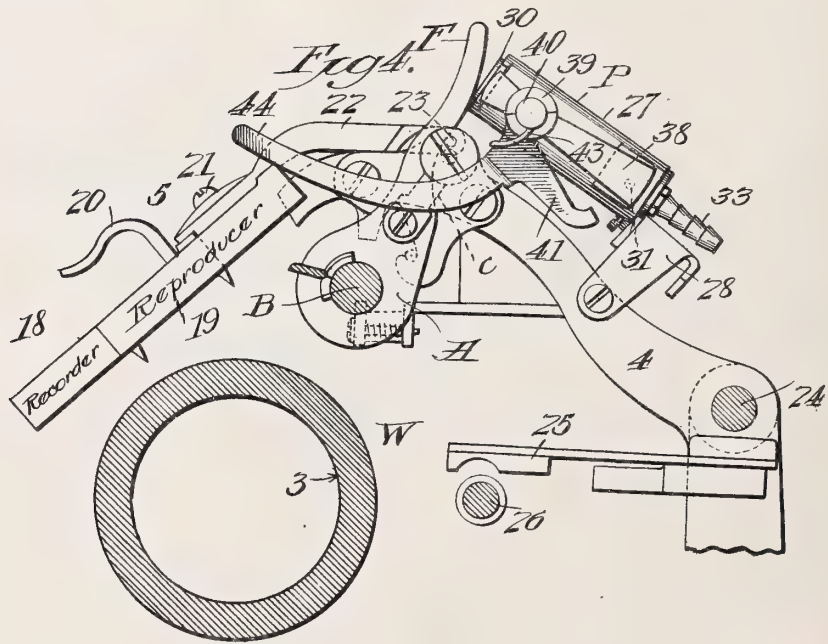


R. B. GOODRICH.
 CONTROL ATTACHMENT FOR DICTATING PHONOGRAPHS.
 APPLICATION FILED JULY 29, 1915.

1,200,100.

Patented Oct. 3, 1916.

3 SHEETS—SHEET 2.



Inventor

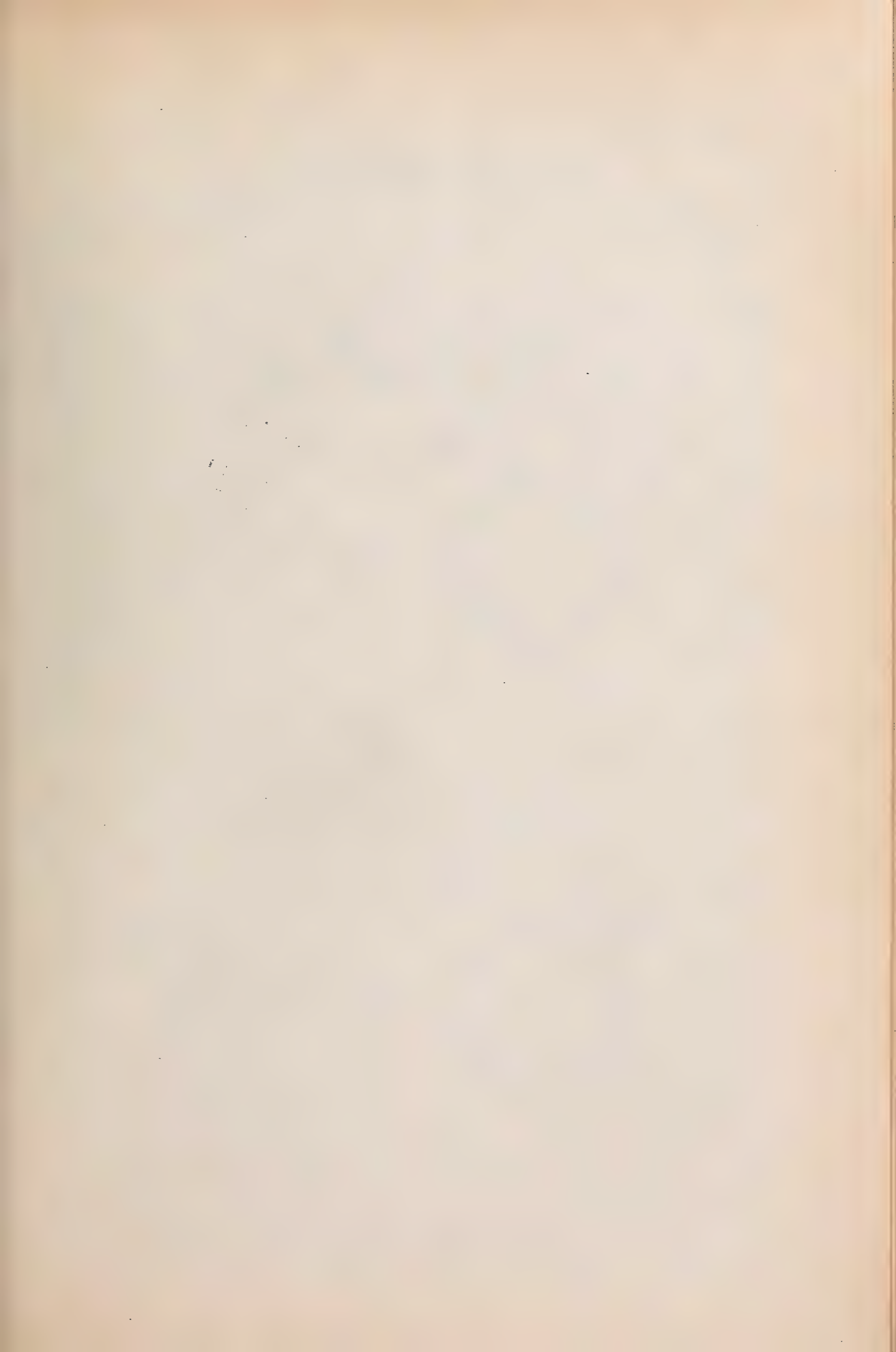
Ralph B. Goodrich

Witness

T. H. Moore

By

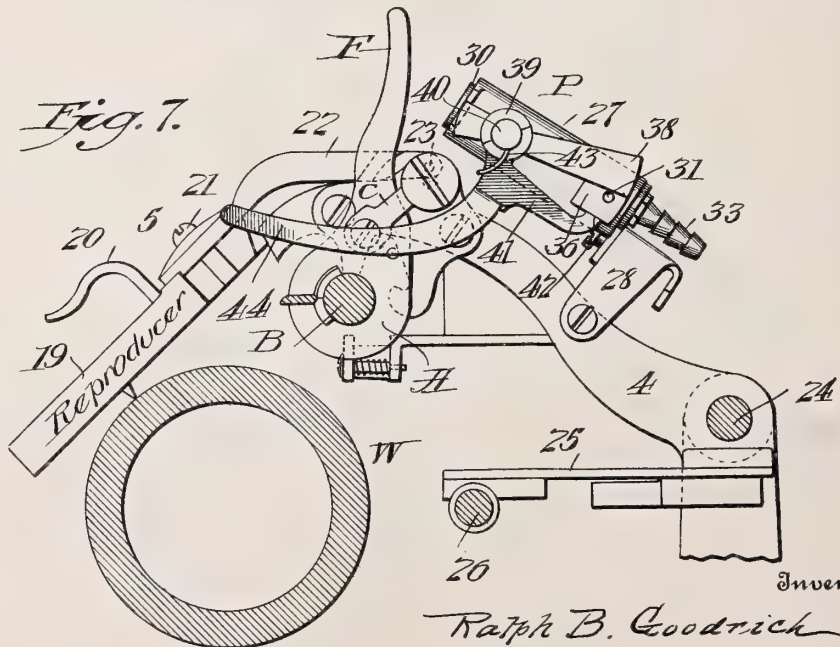
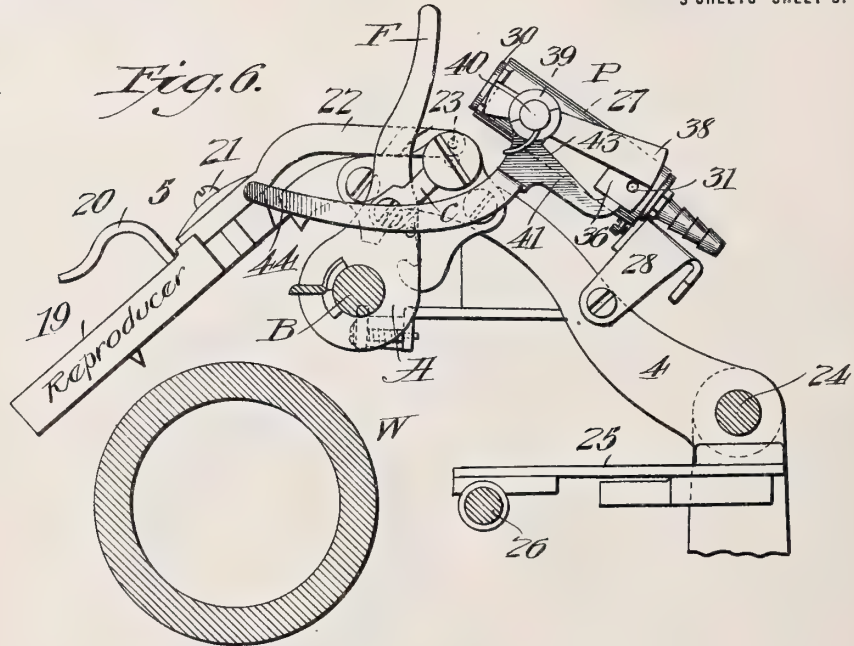
S. P. W. H. H. H.
 his Attorney



R. B. GOODRICH.
 CONTROL ATTACHMENT FOR DICTATING PHONOGRAPHS.
 APPLICATION FILED JULY 29, 1915.

1,200,100.

Patented Oct. 3, 1916.
 3 SHEETS—SHEET 3.



Witness

T. L. Hockaday

By

Ralph B. Goodrich

S. J. Walcott

his Attorney

UNITED STATES PATENT OFFICE.

RALPH B. GOODRICH, OF CINCINNATI, OHIO.

CONTROL ATTACHMENT FOR DICTATING-PHONOGRAPHS.

1,200,100.

Specification of Letters Patent.

Patented Oct. 3, 1916.

Application filed July 29, 1915. Serial No. 42,587.

To all whom it may concern:

Be it known that I, RALPH B. GOODRICH, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Control Attachments for Dictating-Phonographs, of which the following is a specification.

This invention relates to the general subject of phonographs, and more particularly to a novel improvement in machines of this class which are of a commercial character and especially adapted for recording and reproducing dictation.

Machines now in use involving the recording and reproducing principles of the phonograph, for business purposes, are open to the objection that there is no positive and reliable means whereby the liability of the operator to make mistakes in the manipulation of the machine during the recording of the dictation, is entirely eliminated. That is to say, in using the present type of dictating phonograph, it frequently happens that owing to the similarity in appearance of the recorder and reproducer, the operator may readily confuse the same, and thus make two mistakes whereby no record of speech is obtained. The most frequent of these errors occurs when the operator talks into the mouth piece while the recorder is in its "off" position, or when it is not in contact with the wax cylinder. As is well known, in the use of these machines, it is necessary to raise the device carrying the recorder and reproducer so as to change the wax cylinders, and often when the new cylinder is placed in position, the operator starts to dictate without dropping the carrier device to bring the recorder onto the surface of the cylinder. Owing to the slight movement or throw necessary to shift the recorder from its inoperative to its working position, the operator is easily deceived as to the condition of the instrument, and unless he exercises many annoying precautions, and makes a careful and close examination which consumes much valuable time, he cannot be sure as to whether or not his recorder is in position to give the desired result. When the recorder is not in working position on the wax cylinder, the deception may be further carried out since the wax cylinder may be caused to rotate on the throwing in of the clutch by pressing the finger piece of the hand pump. That is, as the operator will

see the wax record in motion, he will believe that the machine is in proper condition for recording his dictation. Accordingly, it will be clear that the most common error incident to the use of the dictating phonograph is largely due to the deceptive condition and appearance of the operating parts, and the operator fails to get the desired record on the wax cylinder, because he forgets to manually throw the recorder into working position on the cylinder, though he instinctively presses the finger piece of the pump to start the cylinder rotating. Another mistake is incident to the use of the reproducer. When the operator desires to hear a portion of what he has dictated, it is necessary to shift the recorder and reproducer carrier so that the reproducer rests on the wax cylinder, and it frequently occurs that the reproducer is unintentionally left on the cylinder and the dictation resumed without getting any record of speech, because the recorder was not shifted into operative position after finishing with the reproducer.

Accordingly, it will be apparent that in order to successfully operate the present machines, close attention must be given to the mechanical working thereof, which under some conditions of use is not only annoying, but distracting to the thought sought to be expressed by the operator. Therefore, the present invention has chiefly in view the elimination of manual control and attention to the several working parts of the apparatus as much as possible, and proposes to utilize a simplified controlling device whereby the manipulation is rendered quick, reliable, and positive.

To this end, the invention has primarily in view a novel controlling device, preferably of pneumatic type, whereby the pivoted carrier portion of the traveling carriage is automatically thrown into operative position simultaneously with the starting of the rotation of the wax cylinder. Thus, since the same operation which starts the cylinder, automatically puts the recorder in working position on the cylinder a record of the dictation will be insured.

Another object of the invention is to provide a device whereby it will be impossible to start the rotation of the cylinder by the usual pneumatic apparatus when the reproducer is on the record, thus giving the operator the signal that his machine is not in condition for recording. In other words,

when the reproducer is on the record, it will be necessary for the operator to resort to the finger trips to stop and start the machine to control the rotation of the cylinder, thereby giving an additional warning that the instrument will not record the dictation since the pneumatic pump device is used only for this purpose.

A further object of the invention is to provide a relatively small and compact device which will not in any way interfere with the structural arrangement of present machines with which it is intended to be used, nor materially affect its appearance, and which will also be quick and positive in operation. In addition to these features, the invention proposes to combine therewith, the essential element of simplicity without sacrificing strength, thereby providing a substantial and reliable device in the nature of an attachment which may be economically manufactured and easily fitted to machines now in use.

With the above and other objects in view which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

The preferred and practical embodiments of the invention are shown in the accompanying drawings, in which—

Figure 1 is a perspective view of a dictating phonograph, showing the application of the present invention. Fig. 2 is a perspective view of the present attachment. Fig. 3 is a horizontal sectional view thereof. Fig. 4 is a side elevation, partly in section of a dictating phonograph, showing the carrier having the recorder and reproducer thereon in its raised position, and the attachment forming the subject of the present invention in its normal at rest state. Fig. 5 is a view similar to Fig. 4 showing the attachment in operative position to throw the carrier device into such a position that the recorder will be in contact with the wax cylinder. Fig. 6 is a view similar to Fig. 4, but showing the reproducer in place of the recorder, and the position that the parts of the attachment assume when the reproducer is in position for reproducing, but out of contact with the wax cylinder. Fig. 7 is a view similar to Fig. 6 showing the reproducer on the wax cylinder, and the relative position of the parts when this condition exists.

Similar reference characters designate corresponding parts throughout the several figures of the drawings.

The present invention is susceptible of being adapted and applied to all machines of the general type set forth. However, for the purpose of showing one application of

the invention, the present drawings illustrate a standard type of Edison dictating phonograph, such as is shown in the patent of Durand, No. 1,106,443, Aug. 11, 1914.

By reference to Fig. 1, it will be observed that 1 designates the casing of a dictating phonograph of the type referred to, having arranged on the top thereof the usual framework 2, record mandrel 3, the traveling carriage 4, and the recorder and reproducer carrier designated generally as 5. The device as shown further includes the usual motor driven pulley 6 and the clutch device 7 which is operated through the medium of the shift rod or clutch shifting device 8 by either a pneumatic cylinder and piston element 9, which constitutes one actuator for the clutch, or a finger trip device 10 including the starting and stopping keys 11 and 12 which constitutes another actuator for the clutch. The pneumatic cylinder and piston element 9 communicates with a hand pump 13 by means of a detachable connection 14 and tube 15, and as usual the said hand pump 13 is provided with a push rod 16 which may be conveniently pressed by the operator's thumb as he grasps the body of the pump carried by the sound conveyer 17.

The sound conveyer tube 17 is fitted at one end with a suitable mouth piece M and is connected at its opposite end with the recorder 18 on the swinging carrier 5. In this type of machine, the carrier 5 also has associated therewith a reproducer 19, the same being arranged in such a position with respect to the recorder that either one of these devices may be rotated into position to contact with the wax cylinder on the mandrel 3 by grasping the handle 20 and swinging or rotating the carrier on its horizontal pivot 21 on the arm 22. This arm is pivoted as at 23 to the traveling carriage 4, so as to have a vertical movement and thereby make it possible to lift the carrier 5 without raising the carriage 4, when desired. Further, for the purposes of illustration, the invention is shown in connection with the type of carriage and carrier controlling mechanism shown in the U. S. patent to Hibbard, No. 1,023,250, April 16, 1912. In this type of device, the traveling carriage 4 is slidably mounted on a guide rod 24 at the rear of the machine, and carries therewith the usual feed nut 25 for engaging with the feed screw 26. As previously described, the carrier 5 is mounted on and movable with the carriage 4 longitudinally of the machine, and also capable of being raised vertically on the pivot 23. That is to say, the carrier 5 and carriage 4 together swing on the rod 24 as a pivot, and for the purpose of maintaining the carrier and carriage in either their up or down position, there is provided a suitable raising

and lowering device A, which is swingingly mounted on a fixed rod B. This raising and lowering device A preferably includes a toggle element C connected with a finger lever F, whereby the toggle C may be shifted so as to raise or lower the entire carrier and carriage on the rod 24 as a pivot. As will be clear from Fig. 4, when the finger lever F is in the position shown, the carriage 4 and the carrier 5 are raised, so that the feed nut 25 is out of engagement with the feed screw 26. However, when the finger lever F is moved, as shown in Fig. 5, the toggle element shifts to such a position that the carrier 5 is lowered onto the wax cylinder, and the carriage 4 is lowered so that the nut 25 engages with the feed screw 26. It will thus be apparent that the raising and lowering of the carrier 5 and carriage 4 is accomplished by the finger lever F which constitutes a single control element therefor. That is to say, when the lever F is moved toward the rear of the machine, it raises the carriage 4 so that the nut 25 becomes disengaged from the screw 26, and also raises the carrier 5 having thereon the recorder 18 and reproducer 19. When the lever is moved toward the front of the machine, the reverse operation takes place. The position of parts for each of these operations is fully illustrated in Figs. 4 and 5.

Although the foregoing description is specific to certain details of arrangement, it will of course be understood that the present invention is not limited in its utility and application to this combination, but is chiefly concerned with the automatic controlling of the finger lever F, or equivalent element, and the signals produced thereby regardless of the particular means employed for accomplishing the usual throw of the carrier and the carriage. The invention is, therefore, intended to be available to any commercial type of dictating machine.

Accordingly, for the purpose of eliminating, as much as possible, manual attention to the manipulation of the dictating phonograph, and automatically controlling the lowering of the carrier 5 and carriage 4, the present invention preferably employs an automatic control attachment. In the preferable form shown, this attachment consists of a pneumatically controlled piston device designated in its entirety as P, and which is mounted on the traveling carriage 4. This device, is preferably in the form of an attachment, and is clearly shown apart from the machine in Fig. 2. As will be apparent from an inspection of this figure, the invention includes in its organization a hollow cylinder 27 having secured to one end a suitable attaching bracket 28, whereby the entire attachment may be readily secured to the carriage 4, directly behind the control lever F. The said cylinder 27 has

slidably mounted therein a working piston 29 having a plunger head 30, and is provided at its rear end with a valve orifice or escape port 31. The end of the cylinder adjacent the valve orifice 31 is closed by a suitable cap or end plug 32 having a nipple 33 for receiving a tube 34 which connects by a T-fitting 35 to the tube 15 of the clutch control apparatus.

Accordingly, it will be apparent that the piston 29 of the present device is pneumatically actuated by air supplied from the hand pump 13, when the latter is operated to throw the clutch 7 into position for connecting the mandrel 3 with the pulley 6. In connection with the T-fitting 35, it may be noted that in the practical operation of the invention, it is necessary to provide the fitting with a larger opening for the tube 34, than for the detachable connection 14. This has been found necessary, since it requires a relatively small quantity of air to throw the clutch 7 into operative position, while it requires a relatively higher air pressure to move the piston or plunger element 29.

Again referring to the novel features of construction of the pneumatic device P, it will be seen that the cylinder 27 is formed with a flat seating valve face 36 surrounding the port 31 to provide a smooth contact surface for the sliding valve cover plate 38 which is part of a valve orifice controlling device 39. This device is pivoted to the cylinder, as at 40, and includes a stop finger 41 which is adapted to rest against an abutment shoulder 42 below the port 31. For the purpose of automatically holding the plate 38 in such a position that the port 31 is uncovered, and the piston in the cylinder rendered inoperative for certain conditions which will hereinafter more fully appear, the said plate 38 is provided with a spring 43 coiled about the shank of the pin 40 and having its free end exerting a tension on the rear of the stop finger 41. The port cover plate 38 also has formed integrally therewith an offset and forwardly extending lever arm 44 which under normal conditions, is in contact with the reproducer 19 to keep the port cover plate 38 in such a position that the port 31 in the cylinder will be closed.

From an inspection of Fig. 4, wherein the traveling carriage 4 is shown in its raised position, and the recorder 18 is also raised from the wax cylinder W on the mandrel 3, it will be observed that the reproducer 19 is in such a position that it presses against the lever arm 44 of the device P to keep the port 31 closed. Assuming that it is desired to make a record of speech on the wax cylinder W, it is only necessary for the operator, with the parts shown in the position indicated in Fig. 4, to

press the finger piece 16 of the pump 13 and thus force air through the tube 15 to the T-fitting 35. At this point the air will divide and go through the detachable connection 14 to throw in the clutch 7 and also go through the tube 34 to the cylinder 27, to throw the piston 29 out of the cylinder, so that the head 30 will push the finger lever F of the carrier forward and thereby throw the recorder 18 onto the wax cylinder W as shown in Fig. 5. At this same instant, the carriage 4 is also thrown into such a position that the nut 25 engages the screw 26. It will of course be apparent that as long as the operator desires to dictate, he maintains the thumb pressure on the member 16, thus holding the clutch 7 in operative position, but if he should desire to stop for a second, it will only be necessary to release the thumb pressure on 16, and the clutch 7 will return to inoperative position and the piston 29 will fall back into the cylinder 27, but the stylus of the recorder 18 will remain in position on the wax cylinder W. When the dictation is resumed, the finger piece 16 is again pressed, and the clutch 7 thrown into operative position, and the piston 29 also forced out of the cylinder 27, but in this movement of the piston no part of the machine is moved as the finger piece F is already in position for permitting the recorder to contact with the record. However, if the operator has been dictating and desires to hear a portion of what he has previously said, it is necessary to bring the reproducer 19 into position for contact with the wax cylinder. That is to say it is necessary to manually lift the carrier 5 by means of the handle 20 on the pivot 23, and swing the reproducer from the positions shown in Figs. 4 and 5 into the position that the recorder normally occupies. As soon as the reproducer 19 is shifted into position for reproducing from the wax cylinder, it will be apparent that the lever arm 44 of the device P is without any support at its front end, and accordingly, the valve cover plate 38 will swing upwardly through the action of the spring 43 and uncover the port 31. Assuming then that the operator having heard the desired portion of his dictation, resumes the remainder thereof, without changing from the reproducer to the recorder, it will be apparent that he cannot start the rotation of the mandrel 3 by pressing on the finger piece 16 of the pump 13. That is to say, as the port 31 is uncovered when this condition of the machine exists, any air expelled by the pump 13 into the tube 15 will pass through the T-fitting 35 into the pipe 34, and thence out of the port 31, instead of branching from the T-fitting 35 into the detachable connection 14 to throw in the clutch, since as has been previously stated, the opening in the

T-fitting which connects with the member 14 is smaller than the opening communicating with the tube 34, and the air will naturally follow the course of least resistance. Thus, the operator will know that he will not get any record of his dictation, since he will not see the mandrel rotating, and seeing this condition of the instrument will readily appreciate that the reason for being unable to start the mandrel, is that he is attempting to talk into the reproducer, and of course will immediately lift the carrier 5 and swing the recorder 18 into proper position, thus raising the reproducer so that the lever arm 44 of the device P is turned to bring the port cover plate 38 over the port 31. Then by a pressure on the finger piece 16, the air supplied by the pump 13 will go through the tube 15, and divide at the T-fitting 35 and go through the tube 34 to push the piston 29 out of the cylinder 27 against the finger piece F, to thus simultaneously start the rotation of the mandrel 3 and lower the recorder onto the wax cylinder.

From the foregoing, it will be apparent that the port 31 in the cylinder 27 is only open when the reproducer 19 is on the wax record. This makes it impossible to throw the mandrel 3 into operation pneumatically, and the starting and stopping of the cylinder is accomplished entirely by the starting and stopping finger trips 11 and 12. This also furnishes another check on the operator and prevents him from dictating into the reproducer, since he knows that when he is talking into the recorder, it is necessary for him to hold his thumb on the finger piece 16 of the pump 13, and when he is reproducing, it is necessary for him to manipulate the finger trips.

When the wax record or cylinder is at a state of rest, and the carrier 5 having the recorder 18 and reproducer 19 thereon in its raised position, and it is desired to dictate, it will be impossible to dictate with the carriage off the cylinder, as the same instant the clutch 7 is thrown into operative position to start the cylinder, the present attachment P automatically throws the carriage into proper position for recording. All during the time the machine is recording, the port 31 in the cylinder 27 remains closed.

From the foregoing, it is thought that the many features and advantages of the invention will be readily apparent, but it will of course be understood that other important objects are attained besides those already alluded to. One of these is of special practical importance in its application to the dictating phonographs now on the market. In explanation thereof, it should be observed that it is not absolutely necessary when the reproducer is in position on the cylinder for

the operator to actually observe with the eye that the cylinder is not running to be apprised of the fact that it would be useless to dictate. Of course, the moment the operator does see that the cylinder is not running, he would know instantly that he should move the dictating diaphragm or recorder into position. But as a matter of fact, under the conditions stated, it is not necessary to depend entirely upon the eye, as a signal or inoperative conditions would be given to the ear, because the moment the operator compresses the pump piston, there will be absolutely no sound from the machine, since no click will sound from the clutch engaging nor any sound be given from the clutch operating mechanism. This double-check is of considerable importance, because it obviates the use of a signal bell or other alarm device to attract the operator's attention that the reproducer is in position instead of the dictating diaphragm or recorder.

Various changes in the form, proportion and minor details of construction may be resorted to without departing from the spirit of the invention or scope of the appended claims.

I claim:

1. In a phonograph, the combination with a rotary member, a clutch device for said member, a clutch shifting device, separate actuators for said clutch shifting device, and a movable recorder and reproducer carrier, of means for rendering one of said actuators inoperative when the reproducer is in operative position with respect to the rotary member.

2. In a phonograph, the combination with a rotary member, a clutch device for said member, a clutch shifting device, separate actuators for said clutch shifting device and a movable recorder and reproducer carrier, of a control attachment including means for operating one of said actuators to cause the starting of the rotary member and simultaneously throw the carrier into operative position.

3. A phonograph, including in combination, a rotary member, a clutch therefor, a clutch shifting device, separate actuators for said clutch shifting device, a movable recorder and reproducer carrier, a control attachment for shifting the said carrier into operative position with respect to the rotary member, an operator's control device connected with one of said actuators and also to said carrier control attachment, said attachment having means for rendering the actuator connected with the operator's control device inoperative.

4. In a phonograph, the combination with a rotary member, a combined manual and pneumatically operated clutch device, and a movable recorder and reproducer carrier, of means for rendering said clutch inoperative

pneumatically when the reproducer is in operative position.

5. In a phonograph, the combination with a rotary member, a clutch device for said member, a clutch shifting device, separate actuators for said clutch shifting device, a shiftable carriage, and a movable recorder and reproducer carrier on said carriage, of a device having means actuated by one of said actuators simultaneously with said clutch mechanism to throw the carrier into recording position and the carriage into traveling position.

6. In a phonograph, the combination with a carrier and carriage, carrier and carriage control means, and a pneumatic clutch mechanism, of a pneumatic device including a cylinder and piston for operating said carrier and carriage control means, the cylinder of said device being in piped communication with said pneumatic clutch mechanism.

7. In a phonograph, the combination with a carrier and carriage, carrier and carriage control means, and a pneumatic clutch operating mechanism of a pneumatic device including a cylinder having an escape orifice and a piston operating therein for controlling said carrier and carriage control means when said orifice is closed, a tube connection between the cylinder and pneumatic clutch operating mechanism, and means governed by a portion of said carrier for opening and closing the orifice in said cylinder.

8. In a phonograph, the combination with a carrier having a recorder and reproducer mounted on a traveling carriage, carrier and carriage control means, and a clutch operating mechanism, of a device actuated simultaneously with said clutch operating mechanism to operate the carrier and carriage control means, and having means governed by the position of the reproducer for rendering itself operative or inoperative.

9. In a phonograph, the combination with a carrier having a recorder and reproducer mounted on a traveling carriage, carrier and carriage control means, and a clutch operating mechanism, of a device including a plunger element actuated simultaneously with said clutch operating mechanism to operate said carrier and carriage control means, and having means governed by the position of the reproducer for rendering the plunger element operative or inoperative.

10. In a phonograph, the combination with a carrier having a recorder and reproducer mounted on a traveling carriage, carrier and carriage control means, and a pneumatic clutch operating mechanism, of a pneumatic control device including a cylinder having an escape orifice, a plunger element movable therein to operate said carrier and carriage control means, and a valve device controlled by the position of the re-

producer for covering and uncovering said escape orifice, said cylinder of the control device being in piped communication with the pneumatic clutch operating mechanism.

5 11. In a phonograph, the combination with a rotary member, a clutch device for said member, a clutch shifting device, manual and pneumatic means for operating said clutch shifting device and a movable
10 recorder and reproducer carrier, of means controlled by the position of said carrier for rendering said pneumatic means inoperative.

12. In a phonograph, the combination with a rotary member, a clutch device for
15 said member, a clutch shifting device, finger trip devices for operating said clutch shifting device, other means including an operator's control element for operating said clutch shifting device, and a movable re-
20 corder and reproducer carrier, of an attachment for operating said carrier and operatively connected with said other means and operator's control element for operating the clutch shifting device, the position of the

carrier controlling said attachment for rendering the operator's control inoperative. 25

13. A phonograph including in combination, the supporting member for the record, the carrier for the recorder and reproducer, and a control device comprising means for
30 throwing the recorder in operative relation to the supporting member, and having means for engaging the reproducer to render the said device operative.

14. In a phonograph, the combination
35 with a rotary member, a movable recorder and reproducer carrier, a clutch device for said rotary member, a clutch shifting device including an actuator therefor, and
40 means for rendering said actuator inoperative when the reproducer is in operative position with respect to the rotary member.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

RALPH B. GOODRICH.

Witnesses:

A. L. QUILL,
E. C. SMALL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

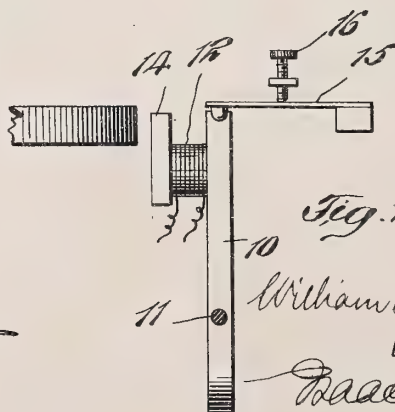
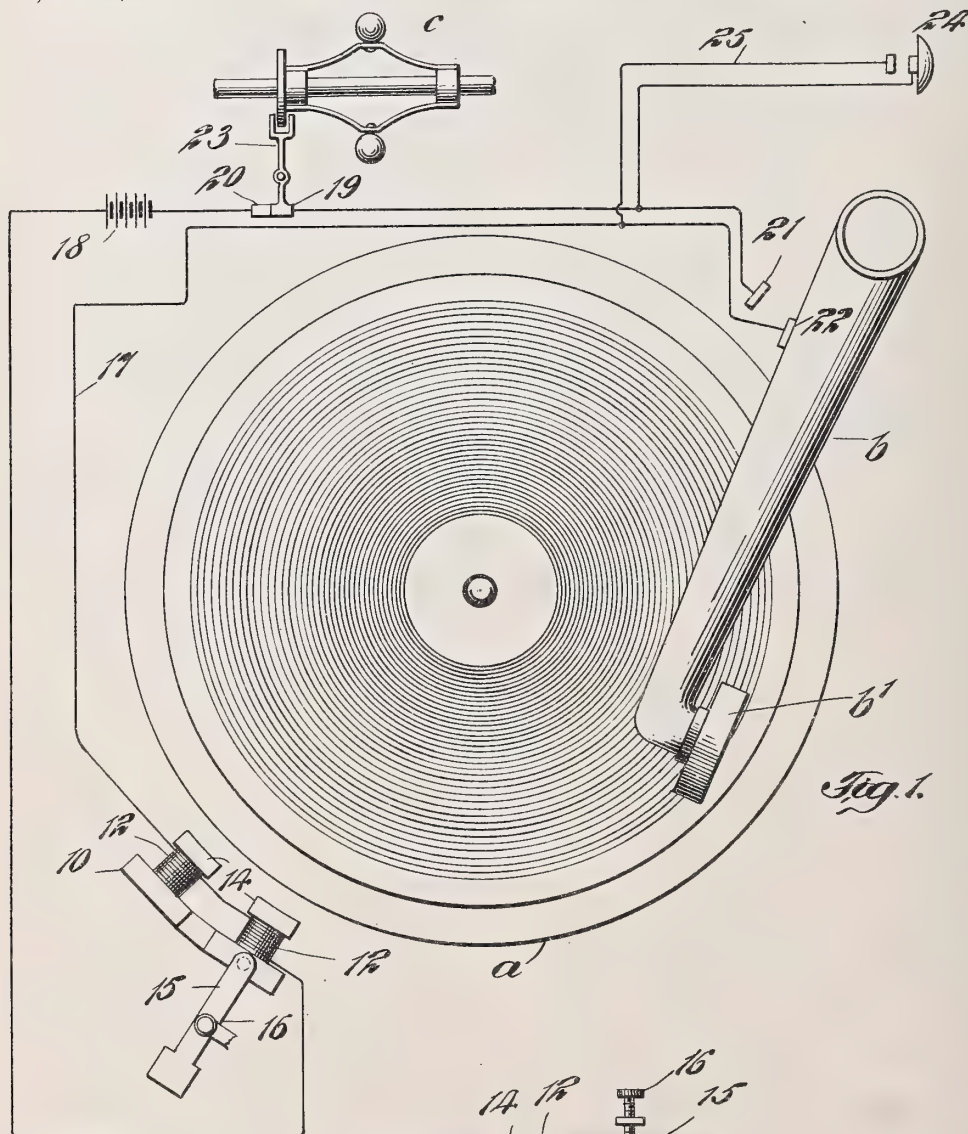
STOP MECHANISM,

#1,200,142-----W.H.Schoonmaker,
Patented-October 3rd, 1916.
Filed-Sept. 9th, 1909.

W. H. SCHOONMAKER.
STOP MECHANISM.
APPLICATION FILED SEPT. 9, 1909.

1,200,142.

Patented Oct. 3, 1916.



WITNESSES:
John H. [Signature]
B. B. [Signature]

Fig. 2.
INVENTOR
William H. Schoonmaker
BY
Wm. B. Owens
ATTORNEY

UNITED STATES PATENT OFFICE.

WILLIAM H. SCHOONMAKER, OF MONTCLAIR, NEW JERSEY.

STOP MECHANISM.

1,200,142.

Specification of Letters Patent.

Patented Oct. 3, 1916.

Application filed September 9, 1909. Serial No. 516,881.

To all whom it may concern:

Be it known that I, WILLIAM H. SCHOONMAKER, of Montclair, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Stop Mechanisms, of which the following is a full, clear, and exact specification, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to stop mechanisms, and comprises a mechanism particularly adapted and intended for arresting the operation of sound reproducing machines at a predetermined point.

My invention is particularly applicable to so-called "graphophones"; and it is in connection with such an instrument that I have illustrated my invention in the accompanying drawings, and will describe my invention in this specification.

Graphophones customarily comprise a rotating table, upon which a flat disk record is placed when the machine is in use, and further comprises a sound reproducing device which, when the machine is in use, is caused to travel across the face of the said record.

These machines are usually provided with a hand operated brake, by which the motion of the table is manually stopped after the sound-reproducing device travels to the end of the record. The underlying object of my invention is to provide an automatic means for arresting the motion of the table in such a way that it will not interfere in any manner with the normal and usual operation of the machine. To this end I provide a movable permanent magnet having an electro-magnet attached, the circuit of which is arranged so that when the sound reproducing device reaches the end of the record the circuit is closed, the electro-magnet energized and attracted to the metallic table bringing with it the permanent magnet so that the field of the permanent magnet reaches to the table and the combined force of the electro and permanent magnets stop the motion of the table. I further arrange the circuit so that the same is broken the instant the motion of the table is arrested, at which time the permanent magnet continues to act on the table and holds it against rotation. When it is desired again to start the machine the permanent magnet is moved back manually to inactive position.

My invention involves various other fea-

tures of importance, all of which will be fully set forth hereinafter and particularly pointed out in the claims.

My invention may be adapted to existing graphophones or it may be embodied as parts of newly constructed machines. For this reason its precise location on the machine is in some respects immaterial and the accompanying drawings go into these details only as regards the essential features of organism and coöperative relation.

In said drawings which are given as an example of the preferred manner of embodying the invention: Figure 1 is a diagram showing in outline the rotating record table and the swinging arm carrying the sound reproducing device and illustrating the connection of my invention, and Fig. 2 is a detached view showing in side elevation the position of the magnets with respect to the table.

In these drawings: *a* indicates the rotating record table which in the commercial machine is usually driven by a spring motor; *b* indicates the swinging arm carrying the sound reproducing device *b'* which arm is propelled across the record by the grooves therein; and *c* indicates the usual governor by which the speed of rotation of the table is controlled.

Suitably mounted on the machine at the edge of the table, but below the same, is a permanent magnet 10, here shown as of the horseshoe type. This magnet is mounted to move toward and from the edge of the table preferably by pivots 11 carried in any suitable bearings (not shown). To the side of the magnet 10 adjacent the table *a* are attached two electro-magnets 12, the pole pieces 14 of which extend upward to a point immediately below the level of the table *a* and directly adjacent to the edge thereof. This table is usually of iron so that the magnets may attract themselves thereto, but if it is not of iron, an iron band may be attached for this purpose.

Preferably, though not necessarily, the magnets are held out of contact with the table by means of a spring latch 15, the tension of which may be regulated by a screw 16. This spring latch prevents idle motion of the magnets, but is not of sufficient strength to restrain the magnets when the electro-magnet or magnets are energized. Upon energization of the electro-magnets they attract themselves to the table and

bring the permanent magnets sufficiently near thereto as to allow their influence also to be exerted. The result is that the magnets stop the action of the table and when the electro-magnets are deenergized the permanent magnets still exert their influence and still restrain the motion of the table.

The circuit 17 of the electro-magnets 12 embodies in addition to the battery 18 or other source of energy, contacts 19 and 20 and contacts 21 and 22. Of these contacts the contact 19 is connected by any suitable means 23 with the governor *c*, while the contact 22 is connected to move with the arm *b*. The contacts 19 and 20 coact with each other and the contacts 21 and 22 coact; and their arrangement is such that as the governor *c* opens under the motion of the machine the contact 19 is engaged with the contact 20 closing the circuit at this point, while the contact 22 engages the contact 21 closing the circuit when the arm *b* has been moved across the table to the end of the record. If desired, a push button 24 may be employed and connected as part of a branch circuit 25 between the contacts 19 and 20 and 21 and 22. This push button may be located at any desired point removed from the machine and by it the circuit may be closed manually before the contacts 21 and 22 are engaged, so that the operation of the machine may be stopped at will.

The operation of my invention may be traced as follows: The machine is started in the usual manner and as its operation begins the governor *c* opens. This closes the circuit at the contacts 19 and 20. As the arm *b* travels across the record the contact 22 is gradually brought toward the contact 21 and when the end of the record is reached and there is no further reason for rotation of the table *a* these contacts engage each other closing the circuit at this point. The circuit is now completely closed and the electro-magnets 12 are energized. Thereupon the electro-magnets attract themselves to the table bringing the field of the magnets 10 into reach and causing both magnets to become active, thus stopping the table notwithstanding the action of the spring or other motor employed to rotate it. As the magnets move toward the table they disengage the retaining latch 15. As the motion of the machine stops, the governor contracts and the contact 19 is moved away from the contact 20 breaking the circuit, so as to prevent waste of electrical energy. When the machine is again started, it is only necessary to move the magnets manually out of engagement with the table and into engagement with the latch 15.

The push button 24 and its branch circuit 25 enables the operator to stop the machine instantly at any point. By employing a combination of electro and permanent magnets

in the manner described I provide a means by which the permanent magnets may be automatically moved into active position and by employing the contacts 19 and 20 under the control of the governor I avoid the waste even of that electrical energy which is necessary to energize the electro-magnets.

The arrangements of the contacts 19 and 20 and 21 and 22 are entirely immaterial excepting with regard as to their essential functions, and said contacts as well as the other elements of my invention may be arranged in the machine in any manner and in any position convenient so long as their proper functions are not interfered with.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States, is:

1. The combination with a machine having a movable magnetic member, of a stop device for such member comprising permanent and electro-magnets connected to each other and movable toward and from said movable magnetic member of the machine, and means for controlling the electro-magnet.

2. The combination with a machine having a movable magnetic member, of a stop device for said member comprising permanent and electro-magnets connected to each other and both movable toward and from the said movable magnetic member of the machine, and means for controlling the electro-magnet, including a device for energizing the magnet at a predetermined point in the operation of the machine.

3. The combination with a machine having a movable magnetic member, of a stop device for said member comprising permanent and electro-magnets connected to each other and both movable toward and from said movable magnetic member of the machine, and means for controlling the electro-magnet including a device for deenergizing the magnet when the machine is stopped.

4. The combination with a machine having a movable magnetic member, of a stop device for said member comprising permanent and electro-magnets connected to each other and both movable toward and from said movable magnetic member of the machine, and means controlling the electro-magnet including a device for energizing the electro-magnet at a predetermined point in the operation of the machine whereby the machine is stopped, and for deenergizing the electro-magnet upon the stoppage of the machine.

5. The combination with a machine having a movable magnetic member, of a stop device for said member comprising a permanent magnet disposed adjacent to said movable magnetic member of the machine and means for automatically moving the said permanent magnet into action after a

predetermined movement of said movable magnetic member of the machine.

6. The combination with a machine having a movable magnetic member, of a stop device for said member comprising a permanent magnet, an electro-magnet adapted to move said permanent magnet into and out of action with respect to said movable magnetic member of the machine, and means for controlling the electro-magnet.

7. The combination with a machine having a movable magnetic member, of a stop device for said member comprising a permanent magnetic brake adapted to act upon said movable magnetic member and means for automatically controlling the action of said permanent-magnet brake upon said movable magnetic member, to stop the machine after a predetermined operation.

8. The combination with a machine having a movable magnetic member, of a stop device for said member comprising a permanent magnet movable into and out of active position with respect to said movable magnetic member of the machine, to arrest or release said movable magnetic member, and means for automatically moving said magnet after a predetermined movement of said movable magnetic member.

9. The combination, with a machine comprising a rotatable member, a traveling member arranged to move progressively as said rotatable member rotates, and a centrifugal governor operated in accordance with the rotation of said rotatable member, of motion-arresting means for said rotatable member, comprising an electro-magnet arranged when energized to move frictional retarding means into engagement with said rotatable member, contact means operated by said traveling member arranged to close the circuit of said magnet at a predetermined point in the travel of said traveling

member, and contact means operated by said governor and arranged to break the circuit of said magnet when the speed of said governor falls below a predetermined minimum.

10. The combination, with a machine comprising a rotatable magnetic member, a traveling member arranged to move progressively as said magnetic member rotates, and a centrifugal governor operated in accordance with the rotation of said magnetic member, of motion-arresting means for said magnetic member, comprising an electro-magnet movably mounted and provided with friction-retarding means which, when the magnet is energized, is moved by and with said magnet into frictional engagement with said magnetic member, contact means operated by said traveling member arranged to close the circuit of said magnet at a predetermined point in the travel of said traveling member, and contact means operated by said governor and arranged to break the circuit of said magnet when the speed of the governor falls below a predetermined minimum.

11. The combination, with a machine comprising a movable member, of an electro-magnet movably mounted to move, when energized, into motion-arresting engagement with said member, and a latch, normally holding said magnet out of engagement with said member, but adapted to release said magnet and permit it to move into such engagement.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM H. SCHOONMAKER.

Witnesses:

ISAAC B. OWENS,
B. BIGGE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PLAYING-RECORD BRUSH,
#1,200,154-----Stanislaw Wisniewski,
Patented-Oct. 3rd, 1916.
Filed-March 1st, 1916.

S. WISNIEWSKI.
PLAYING RECORD BRUSH.
APPLICATION FILED MAR. 1, 1916.

1,200,154.

Patented Oct. 3, 1916.

Fig. 1.

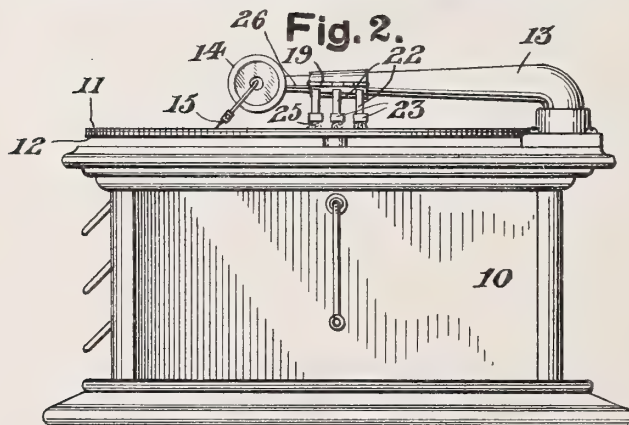
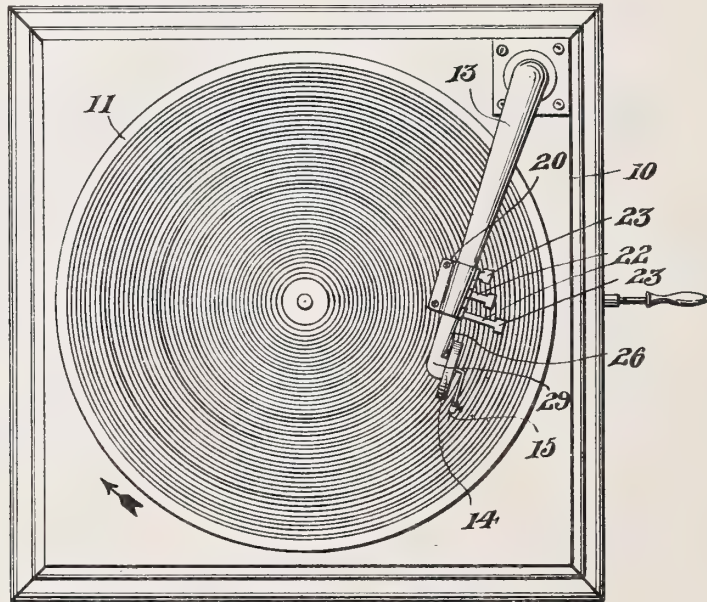


Fig. 3.

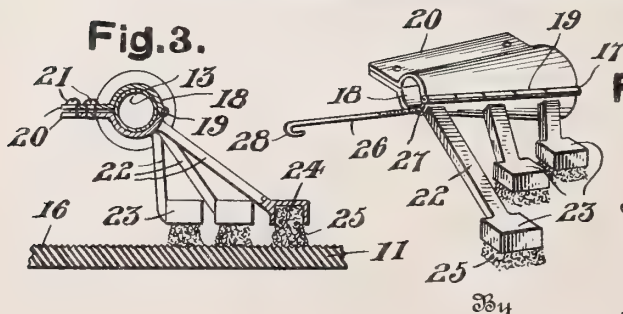
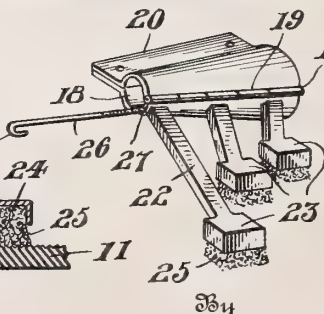


Fig. 4.



Inventor

S. Wisniewski

W. Wilson

Attorney

UNITED STATES PATENT OFFICE.

STANISLAW WISNIEWSKI, OF ERIE, PENNSYLVANIA, ASSIGNOR OF ONE-FOURTH TO
STEFAN WYRZYKOWSKI, OF ERIE, PENNSYLVANIA.

PLAYING-RECORD BRUSH.

1,200,154.

Specification of Letters Patent.

Patented Oct. 3, 1916.

Application filed March 1, 1916. Serial No. 81,419.

To all whom it may concern:

Be it known that I, STANISLAW WISNIEWSKI, subject of the Emperor of Austria, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Playing-Record Brushes, of which the following is a specification.

The primary object of this invention is the provision of a cleaning member for record disks for phonographs and similar machines operable simultaneously with the playing of the instrument, whereby the record member or disk is cleaned in advance of the sound box needle during the entire path of travel of the latter.

It being understood that the record disks for playing instruments such as Victrolas are formed with needle-directing paths or grooves upon their playing surfaces, the said grooves often becoming partially filled with foreign particles tending to clog the needle and to prevent its perfect actuation in accordance with the production inscribed upon the record, a hand-brush is often employed for removing such particles from the record and the present provision arranges a plurality of brushes which will be operatively positioned upon the record for cleaning the same in advance of the needle during the playing operation.

It is also designed to provide an article of manufacture which is readily applied to such classes of instruments now in use, the invention being cheap and easy to manufacture but at the same time fully filling the objects for which it is designed.

With these general objects in view and others that will appear as the nature of the invention is better understood, the same consists in the novel combination and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawings, and pointed out in the appended claims.

In the drawings forming a part of this application and in which like-designating characters refer to corresponding parts throughout the several views:—Figure 1 is a top plan view of a record playing instrument provided with the present device. Fig. 2 is a side elevation thereof. Fig. 3 is a detail transverse sectional view through the device and a record disk operatively posi-

tioned, and Fig. 4 is a perspective view of the invention detached.

A form of record player or Grafonola is herein illustrated having a disk record positioned upon the revolving table thereof, the usual form of sound-conducting tapered tubular neck being employed to the free end of which the sound box is pivoted, the needle carried by the sound box being operatively positioned lying resting upon the adjacent upper surface of the said record.

It will be understood that the table and record are forcibly revolved under the needle in the direction indicated by the arrow in Fig. 1 and that the tracking of the needle is from the periphery toward the center of the disk, the convolute paths or grooves of the record for receiving the needle beginning adjacent the periphery of the record and terminating adjacent the center thereof.

The invention comprises an adjustable split sleeve of tapered or frusto-conical form made in two similar parts connected together by a hinge and arranged opposite the said hinge with flanges adapted for the reception of retaining screws.

A plurality of depending legs, herein illustrated as three in number, and being of different lengths, project at different relative angles from the sleeve at points situated in substantially the same plane. Substantially squared feet are provided at the free ends of the legs having sockets in their lower sides in which brushes of felt or other desirable material are secured for projecting outwardly thereof.

In operation, the parts of the sleeve are separated and the said sleeve readily applied to the instrument neck, to the tapering of which neck the said sleeve may be readily adjusted and then secured by means of the screws. When said sleeve is so secured in place, the feet are arranged in horizontal alinement and in parallelism with the table, the brushes being then positioned to bear lightly upon the exposed playing face of the record during the operative revolutions of the record disk.

It will be noted that the legs gradually decrease in length from the smaller end of the sleeve toward the larger end thereof,

the increase in the diameter of the sleeve compensating for the decrease in the length of the carried legs 22. A positioning rod 26 is adjustably screw-threaded as at 27 in the smaller end of the sleeve 17 and is provided with a finger or stop 28 adapted to seat against the angular end portion 29 of the instrument neck 13, it being understood that the rod 26 may be adjusted, so as to project with the stop 28 at different distances from the sleeve 17 so as to engage the neck portion 29 when the sleeve is secured at the desired adjusted position upon the neck 13. By this adjustment of the rod 26, the position of the sleeve 17 upon the neck 13 may be controlled to insure the brushes 25 sweeping in advance of the stylus 15 and also trailing the same.

The sleeve 17 being operatively positioned upon the neck 13, the same may remain thereon, until it is necessary to replace the brushes 25, the feet 23 and brushes 25 being readily removed from the record 11 by laterally shifting the neck 13, the brushes 25 being readily positioned operatively upon the record 11 when the record is placed upon the table 12 and the needle 15 is swung into its playing position in the record grooves 16. The brushes 25 lightly resting upon the grooves 16, clear all the said grooves or paths of foreign matter such as the scrapings from the record caused by the action of the needle and the grooves 16 will be so brushed and cleared for a number of successive convolutions in advance of the passage of the needle 15 therethrough, while the brush 25 of the longer leg 22 follows up the needle and clears the paths 16 of any scrapings or cuttings from the record made by the said needle.

While the form of the invention herein shown and described is what is believed to be the preferred embodiment thereof, it is nevertheless to be understood that minor changes may be made therein without departing from the spirit and scope of the invention as claimed.

What I claim as new is:—

1. An article of manufacture comprising

a record cleaner consisting of an adjustable tapered mounting sleeve, a positioning rod adjustably projecting from the smaller end of the sleeve, a plurality of legs projecting at different angles from points upon said sleeve in substantially the same plane and decreasing in length from the smaller toward the larger end of the sleeve and brushes carried by said legs positioned to travel in concentric paths.

2. An article of manufacture comprising a record cleaner consisting of an adjustable tapered mounting sleeve, a positioning rod adjustably projecting from the smaller end of said sleeve, a plurality of legs projecting at different angles from points upon the sleeve in substantially the same plane and decreasing in length from the smaller toward the larger end of the sleeve, feet upon the free ends of said legs positioned in the same plane and adapted to travel in concentric paths and provided with sockets in their undersides and brushes positioned in the said sockets.

3. A record cleaning device adapted for attachment to a tone arm comprising a split tapered sleeve having its portions hingedly connected together and adjustably positioned upon the said arm, a rod adjustably in length projecting from the smaller inner end of the said sleeve and having a stop finger in operative engagement with the said tone arm, a plurality of feet projecting at different angles from the said sleeve at points positioned in a single plane substantially parallel to the hinged portion of the sleeve and brush-holding feet upon the said legs arranged in a single plane substantially parallel to the said record when the elements are operatively positioned, the said legs being of different lengths commensurate with the difference in diameter of the said sleeve at the different points of attachment of the said legs therewith, whereby the record is swept in advance of and in rear of the operative end of the tone arm.

In testimony whereof I affix my signature.

STANISLAW WISNIEWSKI.

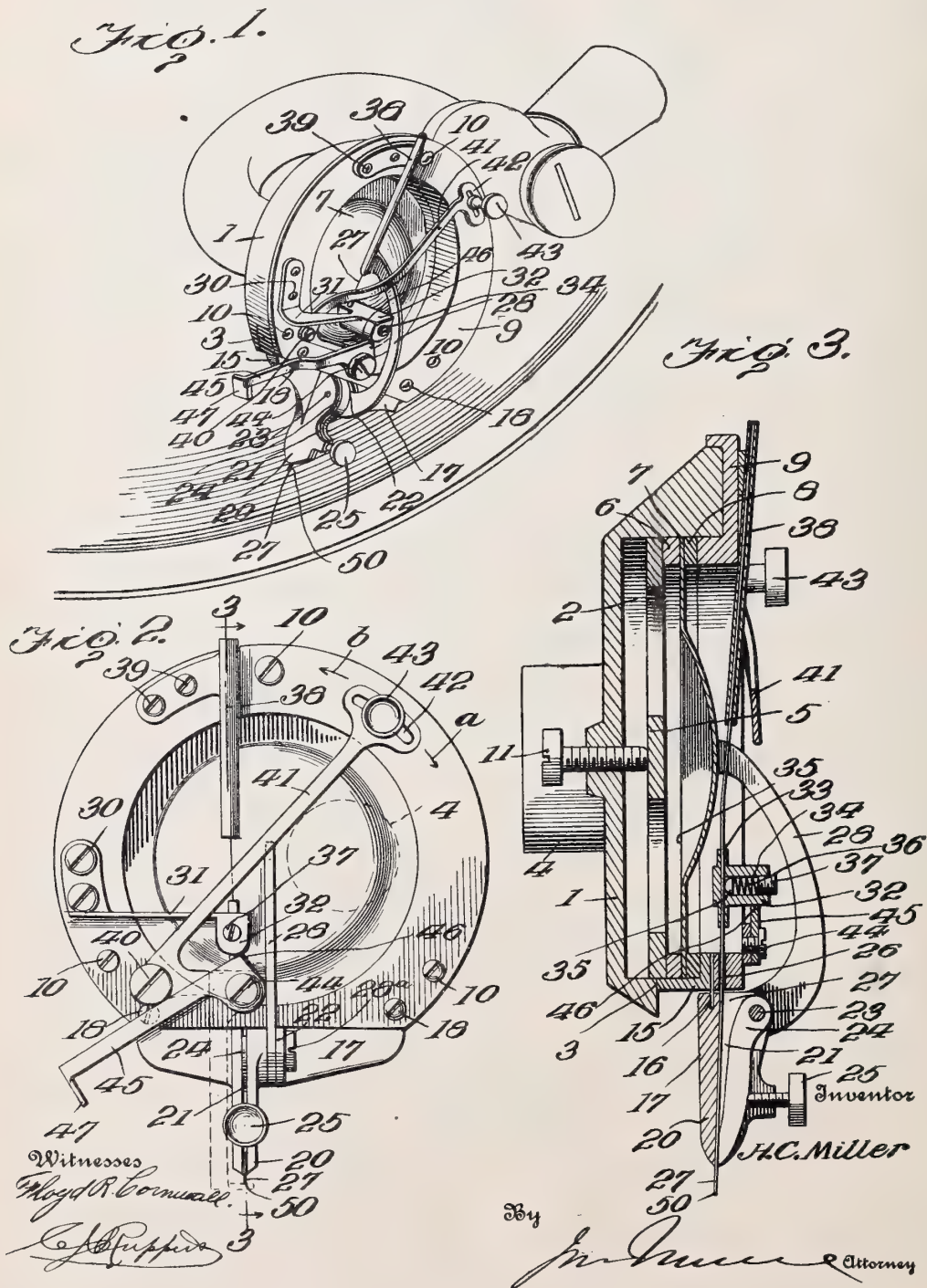
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

GAGE FOR SOUND-BOXES,
#1,200,212-----Henry C. Miller,
Patented-Oct. 3rd, 1916.
Filed-May 15th, 1914.

H. C. MILLER.
GAGE FOR SOUND BOXES.
APPLICATION FILED DEC. 8, 1914.

1,200,212.

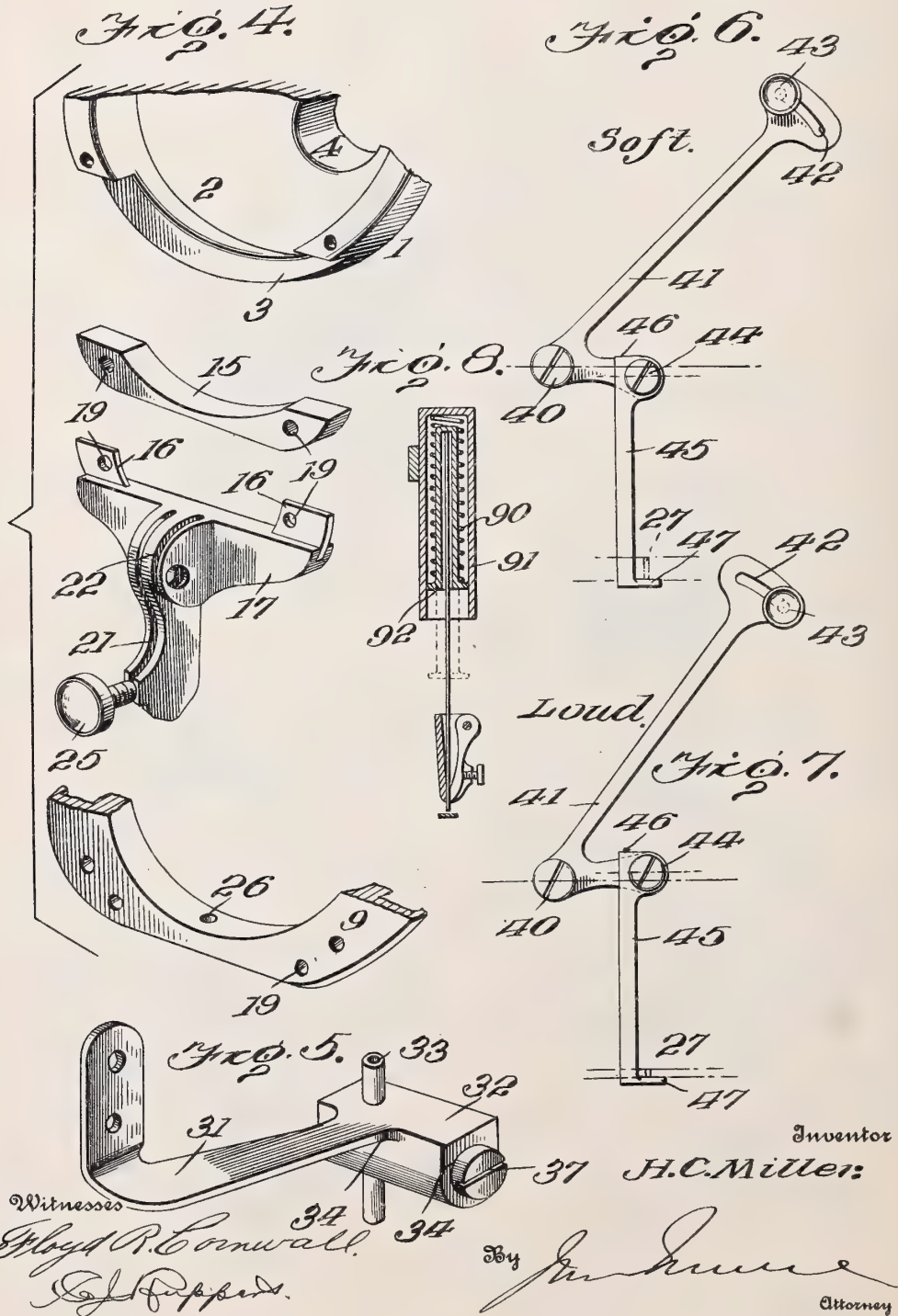
Patented Oct. 3, 1916.
2 SHEETS—SHEET 1.



H. C. MILLER.
GAGE FOR SOUND BOXES.
APPLICATION FILED DEC. 8, 1914.

1,200,212.

Patented Oct. 3, 1916.
2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

HENRY C. MILLER, OF WATERFORD, NEW YORK.

GAGE FOR SOUND-BOXES.

1,200,212.

Specification of Letters Patent.

Patented Oct. 3, 1916.

Application filed December 8, 1914. Serial No. 876,099.

To all whom it may concern:

Be it known that I, HENRY C. MILLER, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented certain new and useful Improvements in Gages for Sound-Boxes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in sound boxes, and more particularly to the means for feeding and gaging the stylus.

In my application for patent filed April 10th, 1914, Serial No. 831,002, I have shown a sound box in which the stylus is formed by feeding a wire from a reservoir, and upon each movement of the wire it is gaged. My present invention is designed to improve the construction disclosed in said application, and in addition thereto I provide automatic means for forcing the stylus downward at the time of gaging of the stylus.

One of the objects of this invention is to provide means for employing a very small wire of uniform diameter, as a stylus, and a simple and convenient means for gaging the wire as it is fed to replace the worn part.

Another object of the present invention is to provide improved means for using the same stylus for softly or loudly reproducing a selection.

These and other objects of the invention will be hereinafter described in this specification, and the construction and arrangement of parts will be readily understood, by reference to the accompanying drawings, in which:—

Figure 1 is a perspective view of a sound box illustrating the application of my invention. Fig. 2 is a face view of the same. Fig. 3 is a central vertical section. Fig. 4 is a view in perspective of the casing and the stylus support. Fig. 5 is a detail perspective view of the friction feeding means. Fig. 6 is a view of the gage illustrating its position when gaging the wire stylus for a soft reproduction. Fig. 7 is a view of the same parts when gaging the wire stylus for

a loud reproduction. Fig. 8 is a detail section of a slight modification.

1 indicates a casing having a depression 2, and a peripheral recess 3, and from the rear of the casing projects a hollow extension 4, to which a sound conveyer is secured.

In the depression 2 is a spider 5, which bears against the washer 6. A diaphragm 7 bears against the washer 6, and on the front of the diaphragm is a second washer 8, the latter being held against a frame 9, fastened to the casing by screws 10. Passing through an opening in a lug on the rear of the casing is an adjusting screw 11, which engages the rear of the spider 5. This screw and the spider acting on the washers, provide means for regulating the pressure at the outer edge of the diaphragm to regulate the tone, as will be understood.

Fitted in the recess 3 is a cross block 15, and between this cross block and the frame 9, is clamped two flexible stylus supporting plates 16, the bottoms of which are fastened in the base of a stylus support 17. Screws 18 pass through openings 19, in the flexible plates and block 15, to secure the parts together. By this construction the stylus support is mounted wholly on the frame 9, and by removing the same the stylus support is also removed from the casing.

The stylus support 17 is formed with an extension 20, which is provided with a stylus groove 21, and a stylus bar groove 22. Pivoted at 23, in the stylus groove 21, is a clamp 24, the lower end of said clamp engaging the stylus wire and serving to hold the same in fixed position. A set screw 25, engaging threads in the walls of the groove 21, bears on the clamp and binds the stylus wire against the rear wall of the groove.

The frame 9 is formed with an opening 26, for the passage of the wire stylus 27.

Secured by a set screw 28^a, in the groove 22, is a stylus bar 28, the upper end being in contact with the center of the diaphragm.

Fastened to the casing, as at 30, is a flat spring member 31, formed at its inner end with a head 32, provided with a vertical opening 33, in alinement with the opening 26, in the frame. The head is also provided with a horizontal opening 34, in which is a plunger 35, and a spring 36, the tension of the spring on the plunger being regulated by a set screw 37. In line with the head 32, is a tube 38, which receives the wire stylus,

the tube being fastened to the frame by screws 39.

Pivoted to the frame 9, at 40, is a bell crank lever 41, the long arm of which extends across the face of the diaphragm, and is provided with a curved slot 42, and through this slot passes a set screw 43, to adjust the position of the said lever. The short arm of the bell crank lever extends under the head 32, and has pivoted to it at 44, a gage 45. The gage is formed at its upper end with a cam edge 46, to act on and elevate the head, in the operation, to take a new grip on the wire stylus, as will presently appear in the following description. The free end of the gage is provided with a flange 47, so located as to come under the free end of the wire stylus, when feeding the latter below the extension 20.

In operation, the set screw 11 is adjusted to obtain the proper pressure on the diaphragm. Then the stylus bar 28 is rocked on its pivot 28^a, to bring the upper free end into contact with the face of the diaphragm and is fastened to and securely clamped by screw 28^a. Assume the parts are in the position shown in full lines in Fig. 2. It will be seen that the wire forming the stylus extends through the tube 38, the vertical openings in the head 32 and frame 9, stylus groove 21, and beyond the extension 20, that portion 50 beyond the extension being the stylus proper, which determines the loudness or softness of the reproduction. If a selection has been played, the stylus is necessarily worn, and to replace it, the gage 45 is swung down to the position shown in dotted lines, in Fig. 2, the flange 47 at this time being directly under the end of the groove 21. In so swinging the gage, the cam edge 46 is removed from the bottom of the head 32. Then the set screw 25, is released, and immediately the flat spring 31 acts to move the head 32 downwardly, and feeds the wire down until the lower end comes into contact with the flange 47. The wire having been fed to the gage, the screw 25 is tightened and the lower end of the clamp 24 binds the wire against the rear wall of the stylus groove. The gage is swung up to normal position, as shown in full lines in Fig. 2, and the cam edge 46 contacting with the head 32, elevates said head against the tension of spring 31, and sets the plunger 35, in position to again feed the wire when the gage is swung downwardly in the next operation.

The spring pressed plunger 35 at all times clamps the wire in the head 32, and consequently when the screw 25 is released, the wire is free to be moved through the stylus groove under the influence of the spring pressed plunger 35, and the flat spring 31, when the gage is swung down. In swinging the gage back to its normal position, the set

screw 25 is tightened and the wire is held taut, and as the cam edge 46 elevates the head 32, the spring pressed plunger 35 slides on the wire, and is set for the feeding operation.

If the selection is to be reproduced softly, the set screw 43 is released, and the bell crank lever 41 is turned in direction of the arrow *a*, which lowers the pivot of the gage, and hence the distance between the bottom of the extension 20 and the flange 47 is increased and the length of the stylus wire beyond the extension is increased, which produces the result now obtained by a soft needle. If the reproduction is to be loud, the bell crank lever 41 is adjusted in the direction of arrow *b*, which raises the pivotal point of the gage, and hence the flange 47 will be closer to the end of the extension 20 when the gage is swung on its pivot to the position shown in dotted lines in Fig. 2. This elevation will shorten the projecting portion of the wire stylus, and the reproduction will be loud.

From the foregoing description, it will be evident that by the construction and arrangement of the parts for mounting the stylus bar and base on the casing, the fulcrum can be brought closer to the center of the diaphragm, which makes a more compact and rigid structure, and serves to produce far better control of the tone quality. It is also to be noted that by mounting the gage on the bell crank, or controlling lever, simple means are provided for modifying the reproduction, and that the same results now obtained by separate loud and soft needles can be accomplished by a simple piece of wire.

A further advantageous result flows from the construction described, in that I am able to employ exceedingly fine wire for the stylus. In fact, the wire used is so fine that it is not essential that it be made pointed at the end.

In the form of the invention shown in Fig. 8, the wire stylus is fed to the stylus support by a spring 90, which is confined in a casing 91. The spring is confined between the casing and a flange 92, formed on a tube, in which the upper end of the wire stylus fits. With this construction, the wire is fed beyond the clamp to the gage, when the set screw 25, is released, in exactly the same manner as when using the friction head 32.

What I claim is:—

1. A sound box comprising a stylus support which receives a wire stylus, means including a swinging element for feeding the wire stylus a determinate distance below the stylus support, and means for binding the stylus wire after the feeding operation.

2. A sound box comprising a stylus support having a stylus groove therein to receive a wire stylus, a clamp pivoted near one

end and at its opposite end engaging the wire stylus, and means acting on the clamp to bind the wire stylus in the groove.

3. A sound box comprising a stylus support which receives a wire stylus, a clamp cooperating with the stylus support, a movable gage, means set by the gage to force the wire stylus down to and into contact with the gage, the wire stylus being forced into contact with the gage when the clamp is released, and means acting on the clamp to bind the wire stylus against movement.

4. A sound box comprising a stylus support which receives a wire stylus, resiliently mounted friction means engaging the wire to force the same beyond the stylus support, a movable gage which moves under the stylus support when thrown in gaging position, and means for releasing the wire stylus to permit the friction means to force the wire into contact with the gage, a part of the gage engaging the friction means to set the same when said gage is moved from gaging position and the wire stylus is held to the support.

5. A sound box comprising a stylus support which receives a wire stylus, means for clamping or releasing the wire stylus, means for gaging the movement of the wire stylus beyond the support, and means for adjusting the gaging means to vary the length of the stylus wire beyond its support.

6. A sound box comprising a casing, a diaphragm mounted in the casing, a stylus support mounted on the casing and having a stylus groove and a stylus bar groove, a clamp mounted in the stylus groove, a stylus bar mounted in the stylus bar groove and engaging the diaphragm, a continuous stylus passing through the stylus groove, and means for gaging the feed of the continuous stylus.

7. A sound box comprising a casing, a diaphragm mounted in the casing, a stylus support mounted on the casing and having a stylus groove and a stylus bar groove, a clamp mounted in the stylus groove, a stylus bar frictionally mounted in the stylus bar groove and engaging the diaphragm, a stylus passing through the stylus groove, and means for gaging the feed of the stylus.

8. A sound box comprising a casing, a diaphragm mounted in the casing, a stylus support mounted on the casing and having a stylus groove and a stylus bar groove, a clamp mounted in the stylus groove, a stylus bar pivoted in the stylus bar groove and engaging the diaphragm, means for securing the stylus bar in the groove, and means for gaging the feed of the stylus through the stylus groove.

9. A sound box comprising a casing, a diaphragm mounted in the casing, a stylus support on the casing to receive a wire stylus, a clamp to hold the wire stylus in its sup-

port, means for automatically feeding the wire stylus beyond the stylus support, a pivoted gage to limit the movement of the wire stylus when fed beyond the support, said gage having a cam edge to engage and set the automatic feeding means when removed from under the support, and means for locking the clamp against the wire stylus.

10. A sound box comprising a casing, a diaphragm mounted in the casing, a stylus support on the casing to receive a wire stylus, means for feeding the wire stylus beyond the support, a clamp, means for binding the clamp on the stylus wire, and resetting means acting on the feeding means to cause the latter to slip on the wire stylus to position for the next feeding operation.

11. A sound box comprising a casing, a diaphragm mounted in the casing, a stylus support on the casing to receive a wire stylus, means for feeding the wire stylus beyond the support, a frictionally mounted movable gage for limiting the movement of the wire stylus beyond the support, the frictional mounting of the gage holding the latter away from the stylus support when the gage is not in use, and means for holding the wire stylus in position after same has been fed by the feeding means.

12. A sound box comprising a casing, a diaphragm mounted in the casing, a stylus support on the casing, to receive a wire stylus, means for feeding the wire stylus beyond the support, an element having a gage to be positioned below the support to limit the movement of the wire stylus, and an adjusting screw to frictionally hold the element in any adjusted position.

13. A sound box comprising a casing, a diaphragm in the casing, a stylus support on the casing to receive a wire stylus, a stylus bar between the support and the diaphragm, means for feeding the wire stylus beyond the support including a resilient member and a spring pressed plunger, a gage for limiting the movement of the wire stylus beyond the support, and means for clamping the wire stylus, said gage acting on the feeding means when thrown from below the support to set said feeding means for the next operation.

14. A sound box comprising a casing, a diaphragm in the casing, a stylus support on the casing to receive a wire stylus, a stylus bar between the support and the diaphragm, means for feeding the wire stylus beyond the support, said means operating to move the wire stylus in one direction only, and means for moving the feeding means in the opposite direction to set the same for the next operation.

15. A sound box comprising a casing, a diaphragm in the casing, a stylus support on the casing to receive a wire stylus, a stylus bar between the support and the dia-

phragm, means for feeding the wire stylus beyond the support, said feeding means including a flat spring mounted on the casing and having an opening for the passage of the wire stylus, a spring pressed plunger to frictionally engage the wire stylus in the opening, and means for adjusting the friction of the plunger on the wire stylus, means for gaging the movement of the wire stylus, and means for securing the wire stylus in the support.

16. A sound box comprising a casing, a diaphragm mounted in the casing, a stylus support on the casing to receive a wire stylus, means for clamping the wire stylus in the support, and means for gaging the wire projecting beyond the support, said means including an operating lever and a gaging lever pivoted to the operating lever, and means for locking the first mentioned lever after adjustment.

17. A sound box comprising a casing, a diaphragm mounted in the casing, a stylus support on the casing to receive a wire stylus in the support, a lever pivoted to the casing, a gage pivoted to said first mentioned lever to determine the projecting portion of the wire stylus beyond the support, means for locking the first mentioned lever, and means for feeding the wire stylus to the gage.

18. A sound box comprising a casing, a diaphragm mounted in the casing, a stylus support on the casing to receive a wire stylus, means for clamping the wire stylus in the support, a lever pivoted to the casing, a gage pivoted to said first mentioned lever to determine the projecting portion of the wire stylus beyond the support, means for locking the first mentioned lever, and means for feeding the wire stylus to the gage, said gage having a cam edge to engage with the feeding means to set the latter for the next operation.

19. A sound box comprising a casing formed with a cut away portion, a diaphragm in the casing, a frame on the front of the casing, a stylus support, flexible plates extending from the stylus support, a block formed with openings and fitting between the frame and the casing, screws passing through the frame and the flexible plates and into the openings in the block, separate screws for fastening the frame to the casing, and a stylus bar extending from the stylus support to the diaphragm.

20. A sound box comprising a casing, a diaphragm mounted in the casing, a stylus support mounted on the casing to receive a wire stylus, and means mounted on the casing to determine and gage the length of the portion of the wire stylus projecting beyond the stylus support, said means being adjustable to vary the length of the stylus.

21. In a sound box, the combination of a

stylus clamp, a gage for gaging the stylus, and automatic means for feeding the stylus to the gage, when the clamp is released.

22. A sound box comprising a casing, a diaphragm mounted in the casing, a stylus support which receives an elongated stylus, means including an element movably carried on the casing for feeding the stylus a determinate distance below the stylus support, and means for clamping the elongated stylus after the feeding operation.

23. A sound box comprising a casing, a diaphragm mounted in the casing, a stylus support extending from the casing and which receives an elongated stylus, means including an element movably carried on the casing for feeding the stylus a determinate distance below the stylus support, means for adjusting the first mentioned means to vary the length of the stylus projecting beyond the support, and means for clamping the stylus after the feeding operation.

24. In a sound box, the combination of a casing, a gage adapted to be positioned in the path of an elongated stylus, means at all times in engagement with the elongated stylus for feeding the latter to the gage to determine the length of said stylus, and means for holding the gage in inoperative position and out of the path of said stylus, said means also holding the gage in gaging position.

25. In a sound box, the combination of a casing, a gage adapted to be positioned in the path of an elongated stylus, means at all times in engagement with the elongated stylus for feeding the latter to the gage to determine the length of said stylus, and means for holding the gage in inoperative position and out of the path of said stylus and to automatically set the feeding means for another feeding operation, said means also supporting the gage in gaging position.

26. In a sound box, the combination of a casing, a stylus support extending from the casing to receive a stylus, a gage carried by the casing and mounted to be moved into the path of movement of the stylus, and automatic means operable in conjunction with the gage to feed the stylus to cause its point to contact with said gage.

27. In a sound box, the combination of a casing, a stylus support extending from the casing to receive a stylus, a gage carried by the casing and mounted to be moved into the path of the stylus, automatic means for feeding the stylus to the gage, and a clamp for holding the stylus in the support, the gage in its movement to inoperative position resetting the automatic feeding means for the next feeding operation.

28. In a sound box, the combination of a casing, a stylus support extending from the casing to receive a stylus, a gage carried by the casing and mounted to be moved into

the path of the stylus, automatic means for feeding the stylus to the gage, a clamp for holding the stylus in the support, the gage in its movement to inoperative position resetting the automatic feeding means for the next feeding operation, and means mounted on the casing and connected to the gage for adjusting the feeding means.

29. In a sound box, the combination of a casing, a stylus support extending from the casing to receive a stylus, a tubular guide mounted on the casing, automatic means on the casing between the stylus support and the tubular guide for feeding the stylus, a movable gage carried by the casing and movable into the path of the end of the stylus to gage the length of same, a clamp for holding the stylus in position in the support, the movement of the gage to inoperative position resetting the automatic feeding means for the next feeding operation.

30. In a sound box, the combination of a stylus support which receives a stylus, a gage mounted to be moved into the path of movement of the stylus, and means operable in conjunction with the gage to feed the stylus to cause its point to contact with said gage.

31. In a sound box, the combination of a casing, a stylus support mounted on the casing to receive a stylus, a gage controlling lever mounted on the casing, a gage mounted on the gage controlling lever and adapted to be moved into the path of movement of the stylus, and means operable in conjunction with the gage to feed the stylus to cause its point to contact with said gage.

32. In a sound box, the combination of a casing, a stylus support mounted on the casing to receive a stylus, a gage controlling lever mounted on the casing, a gage mounted on the gage controlling lever and adapted to be moved into the path of movement of the stylus, and automatic means controlled by the gage to feed the stylus to cause its point to contact with said gage, said automatic means being reset by the gage when the latter is thrown out of the path of movement of the stylus.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY C. MILLER.

Witnesses:

THOMAS J. DUNN,

H. R. VAN KLEECK.

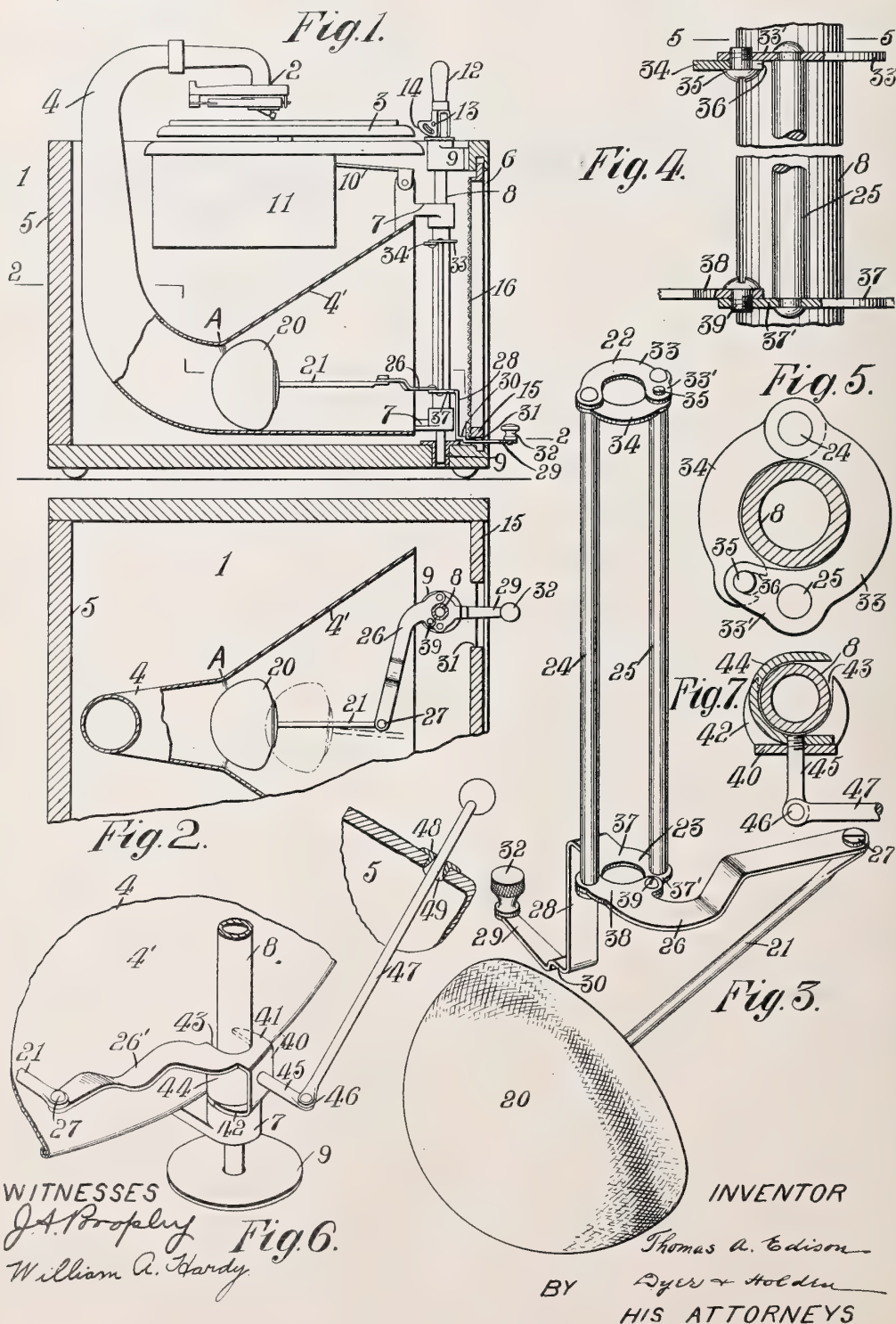
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND MODIFYING DEVICE,
#1,201,449-----T.A. Edison,
Patented-October 17th, 1916.
Filed-April 25th, 1914.

T. A. EDISON.
SOUND MODIFYING DEVICE.
APPLICATION FILED APR. 25, 1914.

1,201,449.

Patented Oct. 17, 1916.



UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR
TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPO-
RATION OF NEW JERSEY.

SOUND-MODIFYING DEVICE.

1,201,449.

Specification of Letters Patent.

Patented Oct. 17, 1916.

Application filed April 25, 1914. Serial No. 834,300.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, Essex county, New Jersey, have invented certain new and useful Improvements in Sound-Modifying Devices, of which the following is a description.

My invention relates to sound modifying devices employed with or adapted for application to phonographs, being in some aspects an improvement on the invention disclosed in my Patent No. 1,110,382, dated September 15, 1914, and entitled Sound modifiers.

One of the objects of my invention is to provide an improved sound modifying device of simple construction which shall be cheap to manufacture and efficient in operation, and which embodies improved means for controlling and effecting the adjustment of the modifier within the sound conveyer of a phonograph to regulate the volume of sound.

Another object of my invention is to provide a device of this character in the form of an attachment capable of being readily applied to phonographs in use.

Other features of my invention reside in the construction of parts and combinations of elements hereinafter more fully described and claimed.

For a clearer understanding of my invention, attention is directed to the accompanying drawing forming a part of this specification and in which—

Figure 1 is a side elevational view, partly in section, of a phonograph equipped with my invention; Fig. 2 is a horizontal sectional view taken approximately on line 2—2 of Fig. 1, parts being shown in full; Fig. 3 is an enlarged view in perspective of the modifying device shown in Figs. 1 and 2; Fig. 4 is an enlarged elevational view, partly in section, of a portion of the rod supporting the amplifier of the phonograph illustrated in Figs. 1 and 2 and showing the connection of the modifying device therewith; Fig. 5 is a sectional view taken on line 5—5 of Fig. 4; Fig. 6 is a fragmental

view in perspective showing a somewhat modified form of my invention applied to a phonograph; and Fig. 7 is a detailed part sectional view of the structure shown in Fig. 6.

In all the views of the drawing, like parts are designated by the same reference characters.

Referring now to the drawing and especially to Figs. 1 and 2, reference character 1 represents a phonograph of the inclosed horn type, the reproducer 2 thereof being connected to and supported for movement across the record table or support 3 by the sound conveyer or amplifier 4, the latter extending rearwardly from the reproducer, thence downwardly into the cabinet or casing 5, and thence forwardly toward the front of the casing. The large horizontally extending exit portion 4' of the amplifier terminates in the rear of the front of the casing adjacent an opening 6 therein, and preferably flares outwardly in an abrupt manner from a section A, hereinafter referred to as the "throat" of the amplifier.

The amplifier is suitably secured adjacent its exit, as by means of brackets 7, to a vertical rod 8 pivotally mounted in aligned bearings 9 secured to the cabinet 5. Reference character 10 designates an arm secured at one end to the upper bracket 7 and provided at its other end with a rack (not shown) adapted to engage with and be driven by a gear of the motor, indicated generally at 11, so as to swing the amplifier about rod 8 and thus feed the reproducer 2 across a record on the support 3. The rod 8 has a portion extending above the upper bearing 9 and a member 12 is pivotally secured at 13 to such portion. Below the pivot 13, the member 12 is provided with a cam 14 engaging the upper surface of the upper bearing 9 whereby the latter serves to support the amplifier and the parts connected therewith. It will be evident that the turning of member 12 about pivot 13 effects, by reason of the coaction of cam 14 and the upper bearing 9, longitudinal movement of rod 8 in bearings 9, and in consequence the lowering or raising of the am-

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plifier 4 to thereby move the stylus of reproducer 2 into and out of operative position with respect to a record on the support 3, and the rack of arm 10 into and out of engagement with its driving gear. A frame 15 is removably mounted in the opening 6 and has secured thereto a covering 16 of fabric or like material whereby the mechanism within the cabinet will be concealed and the appearance of the machine improved.

The construction above described is in general that usually employed in disk phonographs of the Edison type and is similar to that disclosed and claimed in my application, Serial No. 609,100, filed February 17, 1911, and entitled Talking machines.

My improved modifying device comprises in general a modifier 20 disposed in the flaring exit portion 4' of the sound conveyer or amplifier 4 and a device loosely mounted on rod 8 and so connected with the modifier that pivotal movement of the device on rod 8 will effect the adjustment of the modifier longitudinally of the amplifier. The modifier 20 is preferably of a size and shape to completely fill the sound conveyer when located at the "throat" A and preferably consists of a mass of loosely packed cellular or fibrous material, such as cotton waste, horse hair, asbestos or cloth inclosed in a casing of felt or cloth whereby the sound waves or vibrations will pass therethrough without deflection although their amplitude or intensity will be reduced. It will be apparent that the proportion of the total number of sound waves which are caused to pass through the modifier and consequently the degree of modification in the volume of the sound depends upon the location of the modifier within the amplifier.

The modifier engages and is supported by the lower wall of the exit portion 4' of the amplifier and has secured thereto substantially centrally thereof a forwardly extending rod 21.

In the form of my invention shown in Figs. 1 to 5, the device for effecting and controlling the adjustment of the modifier comprises a pair of spaced aligned bearings 22 and 23, in the form of sleeves or rings, loosely mounted on rod 8 between the brackets 7 and respectively secured to the opposite ends of a pair of parallel rods 24 and 25. The upper and lower ends of rods 24 and 25 are respectively secured to the bearings or rings 22 and 23 at diametrically opposite points. The lower bearing 23 is provided with a substantially horizontal arm 26, the free end of which is pivotally connected at 27 to the outer end of rod 21. This bearing is also provided with a member preferably consisting of a vertical portion 28 depending from the bearing and a

horizontal arm or portion 29 connected by a step portion 30 to the lower end of the portion 28. The step portion 30 engages the lower bearing 9 for rod 8 and serves to support the bearings 22 and 23 and the parts connected therewith. The length of portion 28 is such that the bearings 22 and 23 will be supported on rod 8 in the position shown in Fig. 1 with arm 26 and rod 21 substantially horizontal whereby there will be no tendency of the bearings to bind on rod 8 and the device may be easily manipulated to adjust the modifier. The arm 29 extends to the exterior of the cabinet 5 through a horizontal slot 31 provided in the lower part of the frame 15 and this arm is provided at its outer end with a button 32 screwed thereto and serving as a handle. The arm 29 is short as compared with arm 26 and the latter, although extending from bearing 22 at a point diametrically opposite the arm 29, is provided adjacent the bearing with a sharp bend whereby the greater portion thereof is substantially at right angles to the arm 29. Accordingly, a slight movement of arm 29 about rod 8 independently of the amplifier will result in a considerably greater movement of the end of arm 26 in an arc substantially tangent to the longitudinal center line of the amplifier and thereby through rod 21 effect an amplified movement of the modifier 20 longitudinally of the amplifier 4 toward the "throat" A or the exit thereof according to the direction in which the handle 32 is moved. In moving toward the "throat" A, the modifier is directed and guided by the walls of the amplifier. The friction between the modifier 20 and the walls of the amplifier is sufficient to overcome the slight friction between the step portion 30 and bearing 9. Accordingly, as the amplifier swings about the axis of rod 8, the entire modifying device will also swing therewith about the said axis and the position of the modifier within the amplifier will remain unchanged, whereby it is assured that, after the modifying device has once been adjusted, there will be no variation in the modification of the reproduction until further adjustment by the operator or user.

In order that the modifying device above described may be readily applied to phonographs in use, I preferably make each of the bearings 22 and 23 in the form of a two-part ring or sleeve, the two parts of each ring being hingedly connected at one end and detachably connected at the other end. As shown, the upper bearing 22 is composed of two segments 33 and 34 loosely but permanently mounted at one end on a reduced portion of rod 24. The segment 33 is suitably secured to the rod 25 and is considerably longer than segment 34, the end portion 33'

thereof being detachably secured to the free end of segment 34 as by a screw 35. The screw 35 is threaded into segment 33 and the free end of segment 34 is provided with a notch or recess 36 in which the shank of the screw is disposed. The lower bearing 23 is likewise composed of two segments 37 and 38 loosely but permanently mounted at one end on a reduced portion of rod 24. The segment 37 is secured to rod 25 and is longer than segment 38, the end portion 37' thereof being detachably secured to the free end of segment 38 as by a screw 39 engaging a hole in each segment. The member consisting of portions 28 and 30 and arm 29 is secured to and preferably formed integral with segment 37 and the arm 26 is secured to and preferably formed integral with segment 38. It will be apparent that by reason of the construction just described, the bearings 22 and 23 and the parts carried thereby may be readily mounted on the rod 8. The only change necessary in applying the entire modifying device to the phonograph is to provide the front of the casing 5 with the slot 31 for the arm 29.

In the modified form of my invention shown in Figs. 6 and 7, the device loosely mounted on rod 8 comprises a short vertical member 40 having at its ends a pair of horizontal projections or flanges 41 and 42. The flanges 41 and 42 constitute bearings and are provided with alined U-shaped notches or recesses 43 in which rod 8 is disposed. The upper flange 41 is provided with an arm 26', the free end of which is connected by the pivot 27 to the rod 21 attached to the modifier. The parts 41, 42, 43 and 26' may be conveniently formed, as by stamping, from a single piece of sheet metal. The lower flange or bearing 42 rests on the lower bracket 7 and serves to support the member 40 and the parts carried thereby. The upper flange or bearing 42 is spaced from the lower bearing 41 a distance sufficient to maintain the arm 26' and rod 21 substantially horizontal. In order to prevent rod 8 from slipping out of the notches 43 in flanges 41 and 42, I provide between the latter a U-shaped member or "keeper" 44. As shown in Fig. 7, the legs of the U-shaped member 44 are substantially at right angles to the U-shaped notches 43. A rod 45, considerably shorter than the arm 26', extends from member 40 substantially at right angles to said arm. Arm 26' and rod 45 correspond to arms 26 and 28 of the device shown in Figs. 1 to 5. The inner end of rod 45 is threaded into members 40 and 44 and serves to secure the said members firmly together in the position shown in Fig. 7. The outer end of rod 45 is connected by a pivot 46 to a rod 47 which extends transversely of the cabinet 5 and to the exterior thereof through a bearing 48 se-

cured in one of the side walls of the cabinet. A slight longitudinal movement of rod 47 will move rod 45 about rod 8 and thereby effect an amplified movement of the modifier 20 longitudinally of the conveyer in one direction or the other as described above in connection with the construction shown in Figs. 1 to 3. The entire modifying device will also swing with the amplifier about the axis of rod 8 so that the modifier will remain in any adjusted position in the amplifier until further manipulation of the rod 47 by the operator. In applying the device shown in Figs. 6 and 7 to the phonograph, the only alteration necessary is the provision of the bearing 48 in one side of the cabinet or casing 5. The manner of mounting the member 40 and the parts associated therewith on rod 8 is believed to be obvious.

It is to be understood that many changes may be made in the size, shape and arrangement of the parts of the specific embodiments shown and described herein without any departure from the spirit or scope of the invention.

Having now described my invention, what I claim as new and desire to protect by Letters Patent of the United States is as follows:

1. In a phonograph, a sound amplifier mounted for swinging movement about a fixed axis, a sound modifier within said amplifier, and means connected with said modifier for adjusting the same in said amplifier, said means and modifier being mounted to swing with the amplifier about said axis, and said means being turnable about said axis independently of said amplifier to effect the adjustment of the modifier in the amplifier, substantially as described.

2. In a phonograph, the combination of a vertical member, a sound amplifier connected to said member for swinging movement about the axis thereof, a sound modifier mounted within said amplifier for movement longitudinally thereof, and means for effecting such movement of the modifier comprising an arm loosely mounted for turning movement on said member and a rod secured to the modifier and having a pivotal connection with said arm, substantially as described.

3. In a phonograph, the combination with the cabinet thereof, of an amplifier in said cabinet, a vertical rod adjacent the exit of the amplifier, said amplifier being connected with said rod for swinging movement about the axis thereof, a sound modifier within said amplifier, and means for adjusting said modifier comprising a device loosely mounted on said rod and operatively connected with the modifier, said device being provided with an operating member extending to the exterior of the cabinet, substantially as described.

4. In a phonograph, the combination with the cabinet thereof, of an amplifier mounted in said cabinet for swinging movement about a substantially vertical axis adjacent its exit, a sound modifier within said amplifier, and means for adjusting the modifier longitudinally of the amplifier comprising a device mounted for pivotal movement about said axis, a rod connected to the modifier and having a pivotal connection with said device, and an operating member connected to said device and extending to the exterior of the cabinet, substantially as described.

5. In a phonograph, the combination of a vertical rod, a sound amplifier mounted on said rod for swinging movement about the axis thereof, a sound modifier located within and supported by said amplifier, and means for adjusting the modifier longitudinally of the amplifier comprising a member connected to the modifier and a device loosely mounted on said rod for pivotal movement and operatively connected to said member, pivotal movement of said device independently of the amplifier positively effecting through said member movement of the modifier longitudinally of said amplifier, substantially as described.

6. An attachment for phonographs comprising a modifier, and actuating means therefor comprising a device having a pair of spaced aligned bearings adapted to be mounted for pivotal movement about a fixed axis and a connection between one of said bearings and the modifier, substantially as described.

7. A sound modifying attachment comprising a sound modifier, a pair of bearings, means securing said bearings together in spaced relation, each of said bearings comprising two parts hingedly connected at one end and detachably connected at the other end, one of said bearings having an extension, and a rod pivotally connected at one end to said extension and secured at its other end to the modifier, substantially as described.

8. A sound modifying attachment comprising a sound modifier, a device consisting of a pair of spaced aligned bearings adapted to be mounted for pivotal movement about a fixed axis, said device having a pair of arms extending substantially at right angles to the axis of said bearings, and a rod connected to said modifier and having a pivotal connection with one of said arms, substantially as described.

9. A sound modifying attachment comprising a sound modifier, operating means therefor comprising a bearing ring or sleeve, said ring or sleeve consisting of two parts hingedly connected at one end and detachably secured together at the other end, one of said parts being provided with an actuating

member, and the other of said parts being operatively connected with said modifier, substantially as described.

10. In a phonograph, a sound amplifier mounted for swinging movement about a fixed axis, a sound modifier within said amplifier, and means connected with said modifier for adjusting the same longitudinally of said amplifier, said means and modifier being mounted to partake of the swinging movement of the amplifier, and said means being pivotally movable independently of said amplifier to effect the adjustment of the modifier longitudinally of the amplifier, substantially as described.

11. In a phonograph, the combination of a vertical member, a sound amplifier connected to said member for swinging movement about the axis thereof, a sound modifier mounted within said amplifier for movement longitudinally thereof, and means for effecting such movement of the modifier, comprising a pivotally mounted arm and a rod secured to the modifier and having a pivotal connection with said arm, substantially as described.

12. In a phonograph, the combination of an amplifier mounted for swinging movement about a substantially vertical axis, a sound modifier within said amplifier, and means for adjusting said modifier longitudinally of the amplifier, comprising a device operatively connected with said modifier and pivotally movable to effect such adjustment of the modifier, substantially as described.

13. In a phonograph, the combination with a cabinet, of an amplifier in said cabinet, a vertical rod adjacent the exit of the amplifier, said amplifier being connected with said rod for swinging movement about the axis thereof, a sound modifier within said amplifier, and means for adjusting said modifier longitudinally of the amplifier comprising a device operatively connected with the modifier and pivotally movable to effect such adjustment of the modifier, substantially as described.

14. In a phonograph, the combination of an amplifier mounted for swinging movement about a substantially vertical axis, a sound modifier within said amplifier, and means for adjusting the modifier longitudinally of the amplifier, comprising a device mounted for pivotal movement and a rod connected to the modifier and having a pivotal connection with said device, substantially as described.

15. In a phonograph, a sound amplifier mounted for swinging movement about a substantially vertical axis, a sound modifier located within and supported by said amplifier, and means for adjusting the modifier longitudinally of the amplifier, comprising a member connected to the modifier and a piv-

otally mounted device operatively connected
to said member, pivotal movement of said
device independently of the amplifier posi-
tively effecting, through said member, move-
5 ment of the modifier longitudinally of said
amplifier, substantially as described.

This specification signed and witnessed
this 21st day of April, 1914.

THOS. A. EDISON.

Witnesses:

WILLIAM A. HARDY,
MARY J. LAIDLAW.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

AUTOMATIC STOP MECHANISM FOR SOUND
REPRODUCING MACHINES,

#1,201,751-----T.E. Mykins,

Patented-October 17th, 1916.

Filed-January 20th, 1913.

Renewed-August 16th, 1916.

T. E. MYKINS.

AUTOMATIC STOP MECHANISM FOR SOUND REPRODUCING MACHINES.

APPLICATION FILED JAN. 20, 1913. RENEWED AUG. 16, 1916.

1,201,751.

Patented Oct. 17, 1916.

2 SHEETS—SHEET 1.

Fig. 1

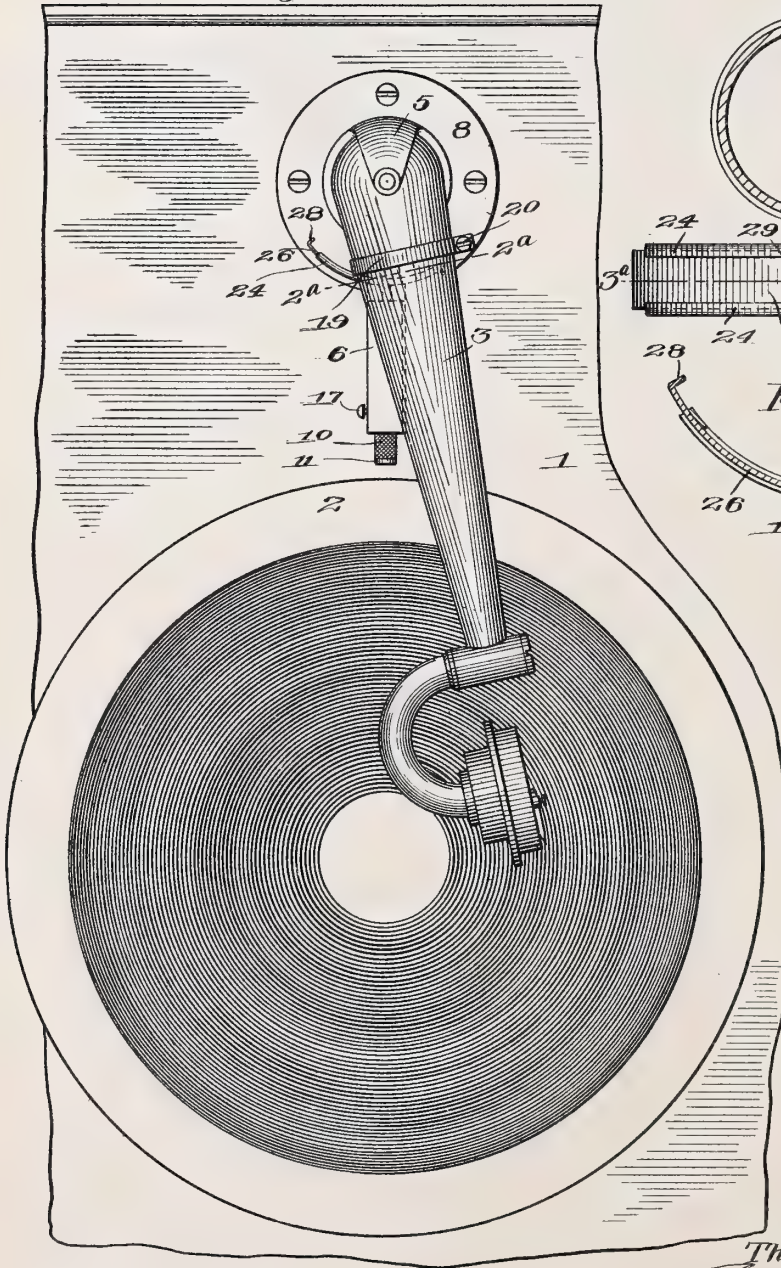


Fig. 2

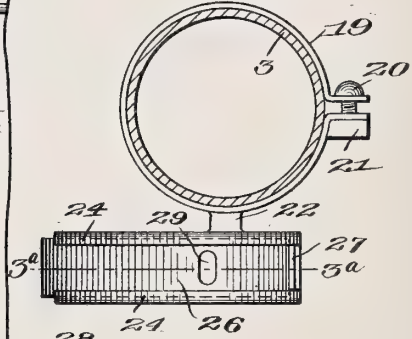


Fig. 3

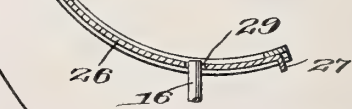
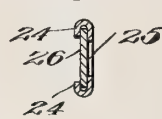


Fig. 4



Witnesses
Nelson H. Copp
Halter B. Payne

Inventor
Thomas E. Mykins
By *Charles Rich.*
his Attorneys

T. E. MYKINS.

AUTOMATIC STOP MECHANISM FOR SOUND REPRODUCING MACHINES.

APPLICATION FILED JAN. 20, 1913. RENEWED AUG. 16, 1916.

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2 SHEETS—SHEET 2.

Fig. 5

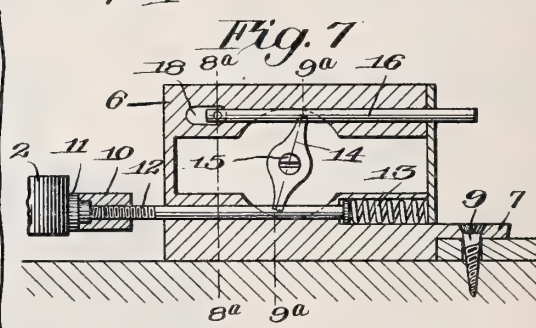
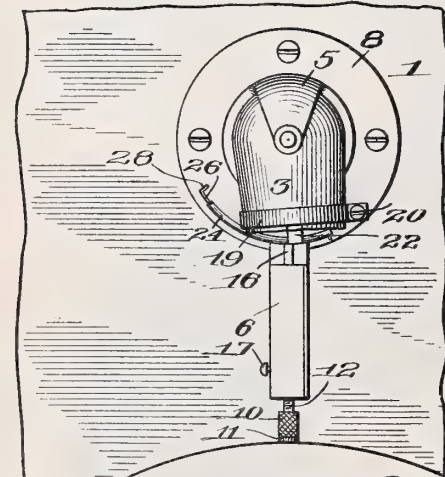
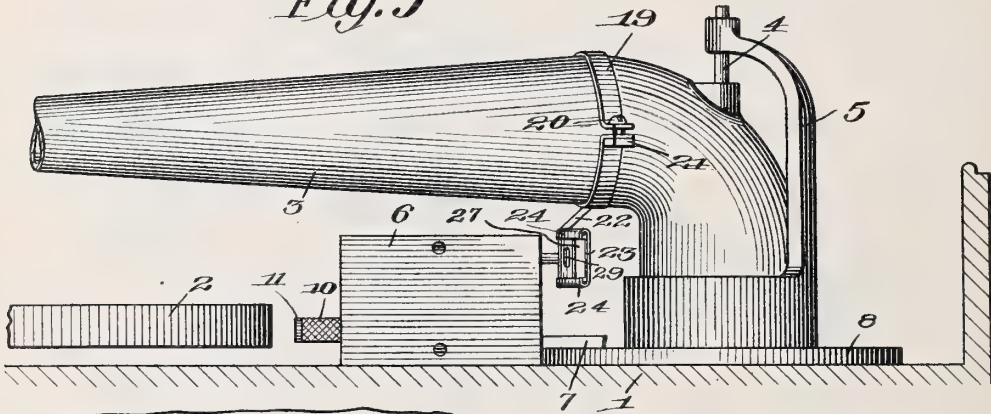
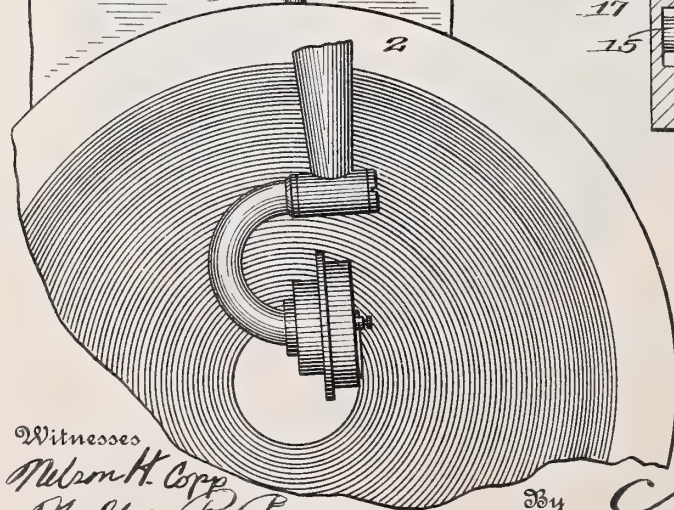
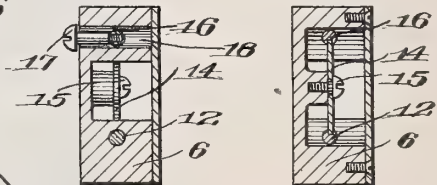


Fig. 8 Fig. 9



Witnesses
Nelson H. Copp
Halter B. Payne

Inventor
Thomas E. Mykins

By *Charles Rich.*

His Attorneys

UNITED STATES PATENT OFFICE.

THOMAS E. MYKINS, OF ROCHESTER, NEW YORK.

AUTOMATIC STOP MECHANISM FOR SOUND-REPRODUCING MACHINES.

1,201,751.

Specification of Letters Patent.

Patented Oct. 17, 1916.

Application filed January 20, 1913, Serial No. 743,085. Renewed August 16, 1916. Serial No. 115,330.

To all whom it may concern:

Be it known that I, THOMAS E. MYKINS, of Rochester, in the county of Monroe and State of New York, have invented certain
5 new and useful Improvements in Automatic Stop Mechanisms for Sound-Reproducing Machines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the
10 accompanying drawings, forming a part of this specification, and to the reference-numerals marked thereon.

My invention relates to improvements in automatic stop mechanisms for sound reproducing machines, and more particularly to the class of machines which are characterized by a rotatable table on which is supported a flat record adapted to be engaged by a needle arranged on a swinging arm,
20 and it has for one of its objects to provide a mechanism by which the parts may be set in advance so as to automatically stop the movement of the rotatable table at a predetermined point, either at the middle or any
25 other part of the record, and to make the device also susceptible of adjustment so as to stop the movement of the table at the end of records of different lengths.

A further object of my improvement consists in providing a construction and arrangement of parts so that the desired adjustment may be instantaneously made, and with little difficulty.

A still further purpose of my invention
35 resides in providing a simple and inexpensive mechanism that may be readily applied to any type of flat record sound reproducing machine.

To these and other ends the invention
40 consists in certain improvements and combinations of parts all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings: Figure 1 is a plan view of a flat record machine, with parts broken to show the application of a preferred embodiment of my invention; Fig. 2 is a sectional view on the line 2^a—2^a of Fig. 1; Fig.
50 3 is a sectional view on the line 3^a—3^a of Fig. 2; Fig. 4 is a vertical sectional view of a portion of the brake releasing device; Fig. 5 is a side elevation; Fig. 6 is a plan view, with a portion of the swinging arm
55 broken away, showing the brake mechanism in engagement with the table; Fig. 7 is a

vertical sectional view of the brake mechanism; Fig. 8 is a transverse, vertical sectional view on the line 8^a—8^a of Fig. 7, and Fig. 9 is a similar view on the line 9^a—9^a of
60 Fig. 7.

Similar reference characters throughout the several views indicate the same parts.

In the present embodiment of the invention, 1 designates the frame on which the
65 parts are mounted and 2 is the rotatable table, which may be operated by any suitable motor as usual in this class of devices.

3 is the swinging arm which is pivotally mounted on the frame upon the post 4, held
70 in position by the standard 5.

The brake mechanism is preferably arranged in a housing 6 which is attached to the frame in any convenient manner, as by means of a lug 7, secured to the plate 8 by
75 means of a screw 9. The brake consists of a milled head 10, which is preferably provided with an inserted portion 11 of resilient material for engagement with the edge of the table and is adjustably supported on
80 the rod 12 whereby the brake mechanism may be readily adapted to tables of different diameters. The rod 12 is slidably mounted in the housing 6, and is actuated normally in the direction of the rotating table by
85 means of the spring 13.

14 is a lever pivoted in the housing upon the set screw 15, the lower end of said lever being in engagement with the aforementioned rod 12, while the upper end of the
90 lever engages a rod 16 which is slidably mounted in the upper part of the housing and carries a finger piece in the form of a screw 17 which travels in a recess 18 and includes a head disposed beyond the side of
95 the housing as shown in Fig. 8. The slidable rod 16 extends beyond the end of the housing, as appearing in Fig. 7, and coöperates with the brake releasing device in a manner which will presently be made clear. 100

The brake releasing device is mounted on the swinging arm 3, preferably in a manner to be adjustable, and in the present arrangement, it includes a split ring 19, the adjacent ends of which are held together by means of
105 a bolt 20 and nut 21. The ring 19 carries a downwardly extending arm 22 upon which is arranged a laterally disposed curved guide 23 which includes upper and lower overhanging flanges 24. 110

25 designates a recess which extends longitudinally of the guide.

26 is a slidable member preferably in the form of a curved plate arranged on the guide 23 and held in proper relation thereto by means of the flanges 24. The member 26 is slidable in the guide, being provided at one end with the finger piece 27 and at its opposite end with the flange 28 arranged to engage one end of the guide so as to limit the inward movement of the slidable member. The member 26 is also provided with a recess or opening 29 which is adapted to receive the end of the rod 16 of the brake mechanism, when the swinging arm is moved to such a position as to bring said recess into alinement with the said rod.

With this description of the construction, the operation will be readily apparent, and, briefly, is as follows: Normally the brake mechanism is in the position shown in Fig. 6, the brake being engaged with the rotatable table. A record having been placed on the table, the arm is moved until the needle is at the point where it is desired to stop the movement of the table. During this preliminary adjustment of the arm, it will be noted that the rod 16 is engaged with the recess in the slidable member 26, thereby holding said slidable member, while the guide 23 moves relatively thereto with the swinging arm. The finger piece 17 is then operated to disengage the brake from the table, which also causes the rod 16 to be withdrawn from engagement with the slidable member 26. The swinging arm is then set at the beginning of the record, the sounds of which are reproduced until the arm has moved far enough to bring the recess of the member 26 into alinement with the rod 16, which then drops in the recess and permits the brake to be forced against the table by the spring 13.

It will be obvious that the invention is not limited to the exact details of construction herein set forth, but comprehends any arrangement which may be characterized by a brake mechanism adapted to be released by a cooperating part that can be laterally adjusted upon the swinging arm to any one of a series of different positions, and preferably a slidable member arranged on a supporting guide.

I claim as my invention:

1. In a machine for reproducing sound, the combination with a rotatable table, of a swinging arm movable over the top of the table, a brake mechanism arranged to engage the table, and a brake releasing device arranged on the swinging arm for cooperation with the brake, said brake releasing device embodying a slidable member adjustable laterally of the swinging arm and cooperating with the brake.

2. In a machine for reproducing sound, the combination with a rotatable table, of a swinging arm movable over the top of the table, a brake mechanism arranged to engage

the table, and a brake releasing device arranged on the swinging arm for cooperation with the brake, said brake releasing device embodying a guide, and a slidable member arranged on the guide and cooperating with the brake.

3. In a machine for reproducing sound, the combination with a rotatable table, of a swinging arm movable over the top of the table, a brake mechanism arranged to engage the table, and a brake releasing device arranged on the swinging arm for cooperation with the brake, said brake releasing device embodying a curved guide, and a curved slidable member arranged on the guide and cooperating with the brake.

4. In a machine for reproducing sound, the combination with a rotatable table, of a swinging arm movable over the top of the table, a brake mechanism arranged to engage the table, and a brake releasing device arranged on the swinging arm for cooperation with the brake, said brake releasing device embodying a curved guide, and a curved slidable member arranged on the guide and provided with a recess which cooperates with a portion of the brake mechanism to release the same.

5. An automatic stop having, in combination, an oscillating-member provided with a curved guide-way substantially concentric with its center of oscillation; a curved controlling-member supported in said guide-way and retained frictionally against longitudinal movement therein, said controlling-member having a recess; a brake; a spring tending to throw the brake into operation; and a second controlling-member connected with the brake and normally seated against the surface of the curved controlling-member, whereby the brake is held out of operation, said second controlling-member having an extremity adapted to enter said recess to permit the brake to operate, and fitting the recess closely so as to retain the curved controlling-member against movement with the oscillating-member when the recess is so engaged.

6. An automatic stop having, in combination, an oscillating-member provided with a guide plate arranged with its width vertical and curved concentrically with the center of oscillation, the guide-plate being provided with upper and lower marginal flanges; a sheet-metal cam-plate embraced by said flanges and held thereby in curved position, the cam-plate being provided with a recess; a brake; a controlling-member connected with said brake and having an extremity engaging the forward surface of the cam-plate and adapted to enter the recess therein; and a spring tending to throw said extremity into said recess and to move said member in a direction to throw the brake into operation.

7. An automatic stop having, in combination, an oscillating-member comprising a clamping-collar, an arm projecting forwardly and downwardly therefrom, and a
5 guide-plate carried by said arm, the guide-plate being arranged with its width vertical and curved concentrically with the axis of oscillation, and the guide-plate having a horizontal slot and upper and lower marginal rearwardly-bent flanges; a cam-plate
10 supported by the guide-plate and retained by said flanges, the forward surface of the cam plate being accessible through said slot,

and the cam-plate being provided with a recess; a brake; a slide-rod carrying the
15 brake and having an end adapted to engage the forward surface of the cam-plate and to enter the recess therein; and a spring tending to throw said extremity into said
20 recess and to move the slide-rod in a direction to throw the brake into operation.

THOMAS E. MYKINS.

Witnesses:

RUSSELL B. GRIFFITH,
H. E. STONEBRAKER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents-
Washington, D. C."

RESONANT DIAPHRAGM,
#1,201,958-----S.Halls & O. Ryan,
Patented-October 17th, 1916.
Filed-March 1st, 1915.

S. HALLS & O. RYAN.
 RESONANT DIAPHRAGM.
 APPLICATION FILED MAR. 1, 1915.

1,201,958.

Patented Oct. 17, 1916.

FIG. 1

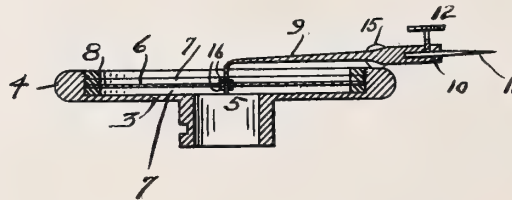
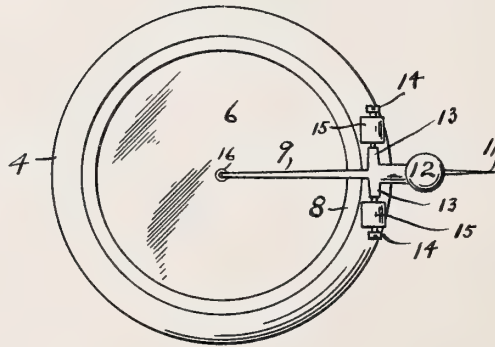


FIG. 2

WITNESSES:

W. L. Sedgwick
B. H. Graff

INVENTORS:

S. HALLS
O. RYAN

BY

Milton S. Braudell
 ATTORNEY

UNITED STATES PATENT OFFICE.

SVERRE HALLS AND OSCAR RYAN, OF SIOUX CITY, IOWA.

RESONANT DIAPHRAGM.

1,201,958.

Specification of Letters Patent.

Patented Oct. 17, 1916.

Application filed March 1, 1915. Serial No. 11,197.

To all whom it may concern:

Be it known that we, SVERRE HALLS and OSCAR RYAN, both citizens of the United States, and residents of Sioux City, in the 5 county of Woodbury and State of Iowa, have invented certain new and useful Improvements in Resonant Diaphragms, of which the following is a specification.

The present invention relates to diaphragms for reproducing sound.

Although the article of our invention finds its greatest use in phonographs, still it may equally as well be employed in other sound-reproducing instruments, as telephone transmitters, stethoscopes, etc.

The invention has for its primary object the production of a diaphragm for phonograph sound-boxes adapted to reproduce sound more clearly and naturally than has 20 hitherto been done.

Another object of the invention has been the production of an improved article of this class inexpensive in production.

The invention will be fully understood 25 from the following description, reference being had to the accompanying drawings which form a part of this application and in which like characters of reference indicate corresponding parts in both views, of 30 which,—

Figure 1 is a rear elevation of a phonograph sound-box equipped with the diaphragm of our invention; and Fig. 2 is a central horizontal section of the same.

35 The sound-box consists of the usual case embodying a plate, 3, having an annular rim, 4, and a central opening, 5.

The diaphragm, 6, is inclosed within the case and is supported between yieldable 40 rings, 7, of insulating material. A ring, 8, is threaded into the rim and into engagement with the outer insulating ring, thereby firmly securing the diaphragm.

9 is the stylus-bar having a bore, 10, to 45 receive a stylus, 11, secured therein by a set-screw, 12; and its intermediate portion is formed with trunnions, 13, oscillating upon screws, 14, threaded into lugs, 15, on the rim of the case. The inner end of the stylus-bar is reduced, bent inwardly to protrude 50 through the diaphragm and is secured by nuts, 16, which embrace opposite sides of the diaphragm.

The diaphragm consists of a very thin

sheet of bone, which when properly prepared and installed, reproduces sound much 55 more naturally than the diaphragms in common use, and also clarifies the reproduction, rendering it free from metallic sounds, harshness and the other evils which attend 60 the use of other diaphragms.

The diaphragm is prepared from a portion taken, preferably, from adjacent the surface of a suitable bone. For this purpose the shoulder-blade of an animal is well suited, 65 the rib of an ox or other bone having a flat portion of sufficient size for the diaphragm desired. The bone is first boiled, then thoroughly cleaned and a flat layer removed therefrom. The layer is then subjected to a hot aqueous fluid, as steam or 70 hot water, in order to render it less brittle and easy to work. By grinding or cutting the layer is then reduced to a uniform thickness of about one sixty-fourth of an inch. 75 It is then held firmly against warping and permitted to thoroughly dry and is then polished on both sides. The diaphragm may then be cut from the thin layer. In U. S. Patent 985,496, February 28, 1911, Ballard 80 suggests the use of ivory for diaphragms for sound-boxes.

Obviously, the diaphragms may be cut and prepared in any preferred manner. 85 The subsection of the bone to a fluid prior to cutting is arbitrary, for perfect results have been attained by cutting the diaphragms from raw, untreated bone.

Although we have described the treatment and use of bone for the diaphragms, we would 90 not be understood as being limited to the use of bone, for other materials, of like nature, having porous, spongy, and flexible properties, fall within the scope of our invention.

Therefore, what we claim as new and desire 95 to secure by Letters Patent of the United States; is,—

A resonant diaphragm comprising a thin sheet prepared from material taken from 100 adjacent the natural surface of a bone.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

SVERRE HALLS.
OSCAR RYAN.

Witnesses:

M. S. CRANDALL,
B. H. GRAFF.

SOUND REPRODUCING MACHINE,
#1,202,213-----J. T. Prout,
Patented-October 24th, 1916.
Filed-June 10th, 1915.

J. T. PROUT.
SOUND REPRODUCING MACHINE.
APPLICATION FILED JUNE 10, 1915.

1,202,312.

Patented Oct. 24, 1916.

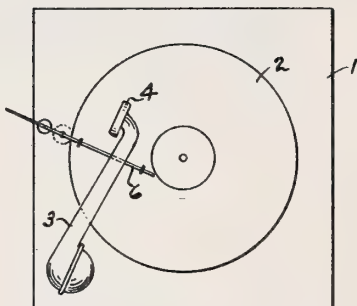


Fig. 1.

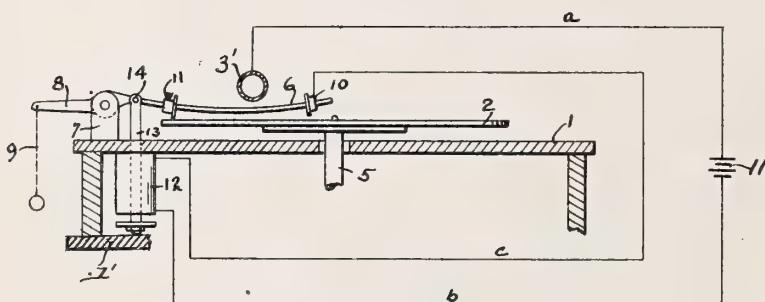


Fig. 2.

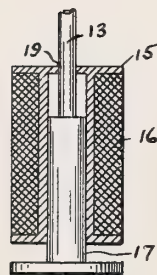


Fig. 3.

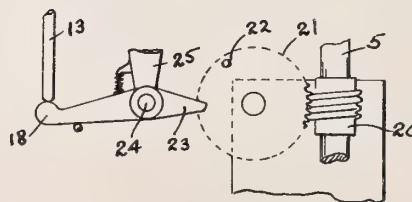


Fig. 4.

WITNESSES:

Edw. F. Chandler
J. M. Ewall

INVENTOR

JOHN T. PROUT

BY

Guido M. Lucido
his ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN T. PROUT, OF NEW YORK, N. Y.

SOUND-REPRODUCING MACHINE.

1,202,312.

Specification of Letters Patent.

Patented Oct. 24, 1916.

Application filed June 10, 1915. Serial No. 33,230.

To all whom it may concern:

Be it known that I, JOHN T. PROUT, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a specification.

This invention relates to machines for the reproduction of sound, commonly known as phonographs or graphophones, and its object is to provide an improved means whereby the needle commonly used in the reproducer will be caused to return to the point of starting automatically after a piece has been played.

A further object of the invention is to provide means by which this may be accomplished without injuring the record or without adding any attachment thereto.

A further object of the invention is to provide an automatic repeating means which is extremely simple and cheap to manufacture and efficient in its operation.

The invention consists in certain novel features of construction and arrangements of parts, hereinafter fully described, illustrated in the accompanying drawings, and specifically claimed.

In the drawings: Figure 1 is a top plan view of a disk type phonograph equipped with my invention. Fig. 2 is a side elevation partly in section showing my invention in place and indicating its relation to certain parts of the phonograph. Fig. 3 is a cross section of an electromagnet of the solenoid type in which the movement of the plunger is restrained giving it the effect of being equipped with a dash pot. Fig. 4 represents schematically a means for automatically accomplishing the purpose of my invention mechanically.

Similar numerals of reference are employed to indicate the corresponding parts throughout the several figures of the drawings.

Throughout the specification and in the drawing I have illustrated and described my invention as applied to a disk type phonograph, but it will be understood that my invention is embodied in the broad idea and that by slight modifications in the arrangement of parts the same may be adapted to cylinder type machines.

In operation the needle is placed near the outer edge of the disk and as the record re-

moves the spiral record track gradually moves the needle toward the center of the disk. When the full sweep of the arm has been completed or in other words when the record is finished a suitable contact will be made for the purpose of energizing the returning mechanism with the result that the needle will be lifted clear of the record and set back to its starting position and so on.

Referring to the drawings, 1 is a phonograph box; 2 is a record; 3 is the reproducer arm of the phonograph; 4 is the needle; 5 is the spindle upon which the record disk is placed, it being understood that as this spindle and an appropriate motor for revolving the same is common to all phonographs, only a portion of the said spindle has been shown.

6 is the returning arm; 7 is a suitable bracket in which the returning arm 6 is fulcrumed; integral with 6 is an extension or lever portion 8 to which is attached a suitable pull cord 9. Mounted upon lever 6 is a contact button 10, which may be set at any desired point on said arm; 11 is a stop button secured to said arm 6.

In Fig. 2, 3', which represents a section of the reproducer arm is connected by means of a suitable conductor *a*, to a source of electrical energy 11. 12 is a suitable electromagnet, the plunger 13 of which is pivoted at 14 to 6, said magnet being connected with the source of energy by means of conductor *b*. Plunger 13 which extends through the magnet 12, is indicated as in contact with the bottom part of the phonograph case 1'. Obviously the motion of plunger 13 and consequently the downward position of the lever 6 may be fixed in any suitable manner, the arrangement shown however serving to prevent the lever 6 from striking against the record 2. The other conductor *c* from the magnet 12 is connected with 10. It will thus be seen that when the reproducer arm moves over so as to contact with 10, the electric circuit will be completed and consequently the magnet energized with the result that lever 6 will be moved upward causing arm 3' to slide toward the stop 11. As the phonograph motor continues to run, it is obvious that the record will be played over again. By reference to the drawing it will be seen that at any time while the record is being played a manual pull on the cord 9 will cause 6 to be raised and consequently 3 to be moved over to point 11, although

only a part of the record may have been played. In the drawing lever 6 is shown as bowed or slightly curved, it having been found by experience that substantially this shape tends to modify the force with which the reproducer arm is returned.

In Fig. 3, which illustrates a modification of the electromagnet 12, 15 is a spool shown in section as is also the wire 16. 17 is the armature which as shown is provided with a shank 13 of smaller diameter. The fit of 13 at 19 may be so regulated that although when the current is on, the armature is moved upward with considerable force and speed, its backward movement to a normal position will be somewhat retarded due to the small air vent at 19.

In Fig. 4, 5 is the phonograph record spindle to which is added a worm 20, meshing with the worm wheel 21. 22 is a stud on the worm wheel adapted to engage lever 23, which is fulcrumed at 24 to a suitable bracket 25. 13 is a portion of the plunger of my return mechanism. Lever 23 of which 18 is an extended part, is adapted to push rod 13 upward when pin 22 moves the end of lever 23. By means of this mechanism, it will be seen that I provide a mechanical scheme which works as follows: The ratio between the worm and worm wheel 20 and 21 is so calculated or the position of the pin 22 is so located that when the record has been revolved a certain number of times, equal let us assume to the playing of the same, pin 22 will be moved around so that as the playing of the record is finished lever 23 will be pushed down and consequently the spindle 13 pushed upward with the result that the reproducer will be returned to its original position as previously described.

From the above it will be clear that I provide a unique device for automatically repeating the playing of a phonograph record, and as explained it is also possible with this invention to repeat any part of the record during the playing period.

When it is desired to employ records of varying diameters, buttons 10 and 11 may be adjusted to different positions on the

rod 6 or either one may be adjusted with respect to the other for the purpose.

I am aware that other means have been devised for accomplishing the above general purpose, but my experience leads me to believe that my invention provides an exceedingly simple mechanism which can be produced at very little cost.

I do not wish to be limited to the exact arrangement shown as it is evident that certain modifications and changes can be made without necessarily departing from the spirit and scope of my invention.

Having thus described my invention, what I claim as new herein and desire to secure by Letters Patent is:

1. In a repeater for phonographs and the like, the combination of a sound box, a swinging arm carrying the same, a curved arm adapted to be traversed by said swinging arm, a support to which said curved arm is pivoted and magnetic means for raising the said curved arm.

2. In a repeat mechanism for phonographs, the combination of a sound reproducer mounted upon a swinging hollow arm, a lever over which said swinging arm is adapted to travel pivotally connected to said phonograph, a contact member carried by the lever and adapted to engage said swinging arm, magnetic means adapted to raise the said lever; and electrical means for causing said magnetic means to operate when said swinging arm engages said contact member.

3. In combination with a phonograph, a sound conveying arm mounted to swing horizontally, a lever below said arm and adapted to be moved in a vertical plane, stops adjustably mounted upon said lever, magnetic means for raising the lever, a source of electrical energy for said magnetic means and means for causing energy to flow from said source to said magnetic means when the said arm contacts with one of said stops.

JOHN T. PROUT.

Witnesses:

LOUIS VON KOVACSK,
HUGO HUNZUTORY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

RECORD CLEANING ATTACHMENT FOR
PHONOGRAPHS,

1,202,428-----L. E. Rennell,
Patented-October 24th, 1916.
Filed-February 15th, 1916.

L. E. RENNELL.
 RECORD CLEANING ATTACHMENT FOR PHONOGRAPHS:
 APPLICATION FILED FEB. 15, 1916.

1,202,428.

Patented Oct. 24, 1916.

Fig. 1.

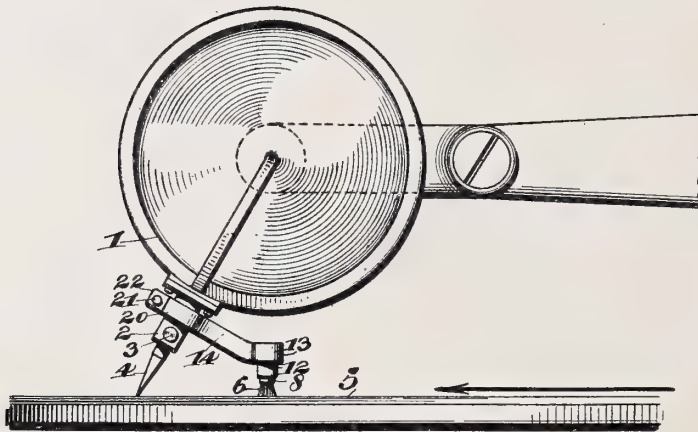


Fig. 2.

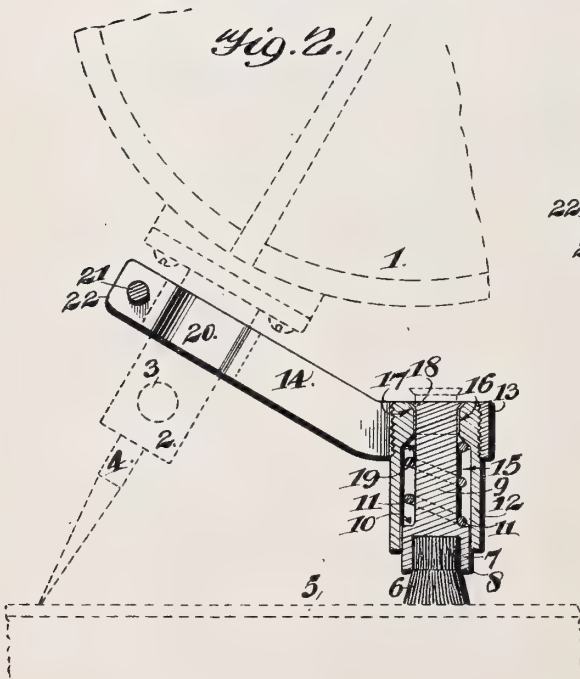


Fig. 3.

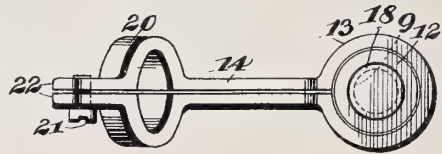
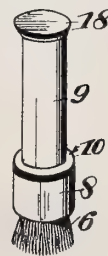


Fig. 4.



WITNESSES:
E. H. Cullaghan
J. B. Schrott

INVENTOR
 LORENCE E. RENNELL,
 BY
Man. Ho.
 ATTORNEYS

UNITED STATES PATENT OFFICE.

LORENCE ELLSWORTH RENNELL, OF BUFFALO, NEW YORK.

RECORD-CLEANING ATTACHMENT FOR PHONOGRAPHS.

1,202,428.

Specification of Letters Patent. Patented Oct. 24, 1916.

Application filed February 15, 1916. Serial No. 78,487.

To all whom it may concern:

Be it known that I, LORENCE ELLSWORTH RENNELL, a citizen of the United States, and a resident of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Record-Cleaning Attachments for Phonographs, of which the following is a specification.

My invention relates to cleaning means for removing particles of dust from the sound groove of a phonographic record and it consists in the constructions, combinations, and arrangements of parts herein described and claimed.

The principal object of my invention is to provide a cleaning brush of soft material the brush being arranged in a position in advance of the sound reproducing needle, so as to clear the sound groove of any particles of dust and thereby render the reproduction of the sounds more perfect as well as to obviate grinding of the surface of the groove.

Another object of my invention is to provide a cleaning brush such as described which may readily be attached to the needle chuck of any phonograph and in which provision is made to keep the brushing surface in constant contact with the uneven surface of the sound groove of the phonographic record.

Other objects and advantages will appear in the following specification, my invention being illustrated in the accompanying drawing forming a part of this application in which—

Figure 1 is a side elevation of the sound box of a phonograph illustrating my invention as applied to the needle chuck, Fig. 2 is an enlarged longitudinal section of the device showing the needle chuck and the sound box in dotted lines, Fig. 3 is a plan view of the attachment, and Fig. 4 is a detail perspective view of the cleaning brush *per se*.

In the drawing, 1 is the sound box of a phonograph which in this particular instance, is of the disk record type, the needle chuck 2 which forms a part of the sound box 1, being provided with a suitable clamp screw 3 by which the reproducing needle 4 is clamped into position as shown.

The needle 4 engages the sound groove of the disk record 5 in the well-known manner, the record 5 being rotated in the direction of the arrow in Fig. 1. In order to remove

particles of dust which may have lodged in the sound groove and collected there, I provide a brush 6 which will preferably be composed of camel's-hair bristles, and which is arranged to engage the sound groove in advance of the needle 4, to clean the groove and render the reproduced sounds more clear.

The brush 6 is set in the socket 7 of an enlarged head 8 of the brush shank 9 by a suitable setting cement and the diameter of the head 8 is made slightly greater than that of the shank 9 so as to provide a shoulder 10 against which one end of a light tension spring 11 rests. The brush shank 9 is mounted in a holder 12 which is externally threaded at the top and is thereby screwed into the correspondingly threaded base 13 of the bracket 14 as shown in Fig. 2.

The brush holder 12 is provided with a bore 15 of a diameter sufficiently great to admit the head 8 and permit it to move easily therein, the bore 15 being of a diminished diameter as at 16 to permit passage of the brush shank 9. The bore 16 is counter-sunk as at 17 so as to provide a seat for a similarly formed flange 18 of the shank 9. The flange 18 normally rests in the seat 17 forming a flush top surface and performing the principal function of limiting the downward thrust of the brush shank 9. The brush 6 is kept in contact with the surface of the sound groove, by the tension spring 11, which rests at its upper end on a shoulder 19 formed at the junction of the bores 15 and 16; the spring in pressing against the shoulder 10 thus keeps the brush on the surface of the record and the spring being very light will easily yield when the brush encounters any protuberance of unusual dimensions.

The bracket 14 consists of a strip of metal which possesses a degree of resiliency, but when doubled on itself as shown in Fig. 3, is rigid enough to fulfil the requirements of a bracket.

The bracket 14, as previously stated, comprises the threaded base 13 which is disposed in a horizontal plane with the record 5 when the device is attached as in Fig. 2. The arms of the bracket extend at an obtuse angle to the base 13 and each arm is provided with a semicircular enlargement 20 which in their opposed disposition form a collar which when the device is applied, encircles the needle chuck 2. The collar is

tightly clamped to the chuck 2 by a clamp screw 21 which passes through ears 22 which extend from the portions 20 and are continuations of the arms of the bracket 14 as clearly shown in Figs. 2 and 3.

In operation the clamp screw 21 is removed and the members of the bracket 14 are spread far enough apart to permit the portions of the collar 20 to be fitted on the needle chuck 2 of the sound box 1. The clamp screw 21 is then replaced and after having adjusted the brush 6 so as to give it a light bearing on the surface of the record 5, the screw 21 is tightened and the device is in position for subsequent use. As previously stated, the tension spring 11 will preserve the contact of the brush with the sound groove of the record 5. The location of the brush 6 in advance of the reproducing needle 4, serves to dislodge all particles of dust which may have collected in the sound groove, and thus renders the sound reproduction clearer as well as to obviate grinding of the wax surface of the groove which does occur, if only to a minute degree where the dust is allowed to remain.

While I have shown only one form of my invention it is obvious that minor variations may be made, such as replacing the collar 20 by a hinge joint and placing the clamp screw 21 through the arms of the bracket 14, one of these arms in such an embodiment being cut to permit the functions of the hinge joint, without departing from the spirit of the invention or the scope of the claims.

I claim:—

1. In a phonographic record cleaning device, the combination with the needle chuck; of a bracket adjustably secured to the chuck, a brush associated with the bracket and arranged to engage the surface of the sound groove, and a tension device for causing the brush to follow the undulations of the sound groove.

2. In a phonographic record cleaning device, the combination with the needle chuck; of a bracket adjustably secured to the chuck, a hollow holder arranged on the bracket, a brush mounted in the hollow holder and arranged to engage the surface of the sound groove, and a tension spring disposed within the hollow holder and associated with the brush.

3. In a phonographic record cleaning device, the combination with the needle chuck, of a bracket adjustably secured to the chuck the bracket including an internally threaded base, a holder having an internally threaded surface for engaging the threads of the base the holder having bores of two diameters, a brush associated with the holder and including a shank to engage the bore of lesser diameter and a head to en-

gage the bore of greater diameter, a tension spring located in the latter bore and coacting with the brush head, and means for limiting the outward thrust of the brush.

4. In a phonographic record cleaning device, a bracket having an internally threaded base, a holder mounted in the threaded base the holder having a countersunk bore at the top and a counter bore at the bottom terminating in a shoulder at the juncture of the bores, a shank having a flange located in the upper bore the flange being adapted to engage the counter sink, a recessed head formed on the lower end of the shank the diameter of the head being equal to that of the counter bore a shoulder being formed at the juncture of the head and shank, brush bristles, located in the recess of the head, and a tension spring disposed on the shank engaging the shoulder of the head and the shoulder of the counter-bore.

5. In a phonographic record cleaning device, the combination with the needle chuck; of a horizontally disposed base, a bracket extending from the base at an obtuse angle, a clamping means located at the end of the bracket arranged to be secured to the needle chuck, a vertically disposed hollow holder pendent from the base, a shank having a recessed head located in the hollow holder, a spring for thrusting the shank outwardly, a flange for limiting the said outward thrust, and a cleaning brush located in the recess of the shank for engaging a record sound groove to remove dust in advance of the needle.

6. A phonographic record cleaning device, a bracket consisting of a strip of resilient metal bent into a circular shape to form a base said base being internally threaded, parallel arms extending from the base at an obtuse angle, each of the arms having a semi-circular enlargement arranged oppositely to form a collar, ears disposed on each enlargement forming a continuation of the shank arms the ears having threaded apertures to receive a clamp screw, a holder having an externally threaded end mounted in the base the holder having a counter-sunk bore, at the top and a counter-bore at the bottom, a shoulder being formed at the juncture of the bores, a brush shank located in the upper bore and having a flange adapted to engage the countersink, in the upper bore, a recessed head mounted in the counter-bore, the head being a part of the shank a shoulder being formed at the juncture of the head with the shank, brush bristles set in the recess, and a tension spring disposed on the brush shank engaging the shoulders of the head and counter-bore.

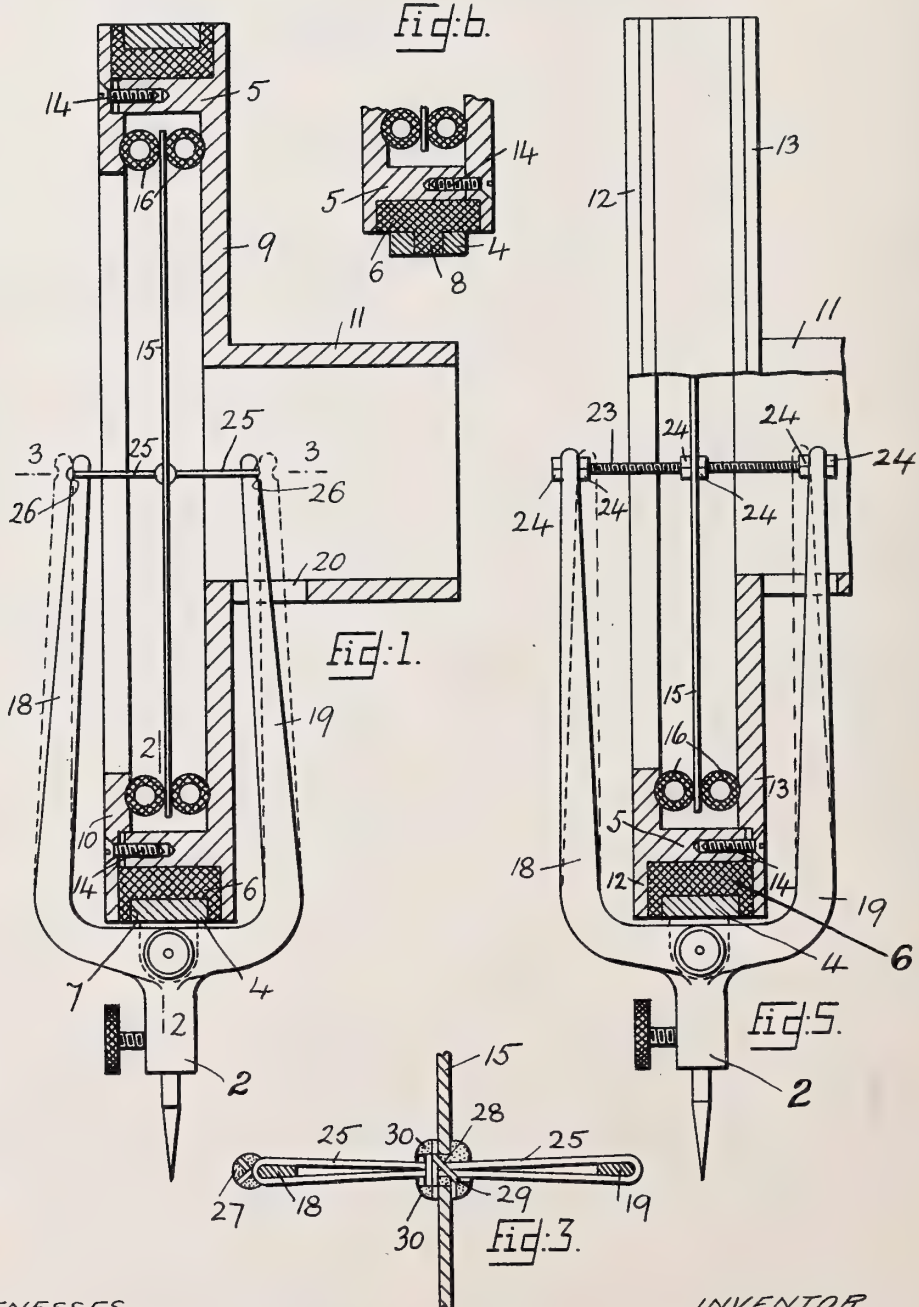
LORENCE ELLSWORTH RENNELL.

SOUND BOX,
#1,202,520-----J. Hoffay,
Patented-October 24th, 1916.
Filed-March 13th, 1914.

1,202,520.

Patented Oct. 24, 1916.

4 SHEETS—SHEET 1.



WITNESSES
L. E. Barry
L. H. Schmidt

INVENTOR
JOSE HOFFAY,
BY *Munn & Co.*
ATTORNEYS.

J. HOFFAY.
SOUND BOX.

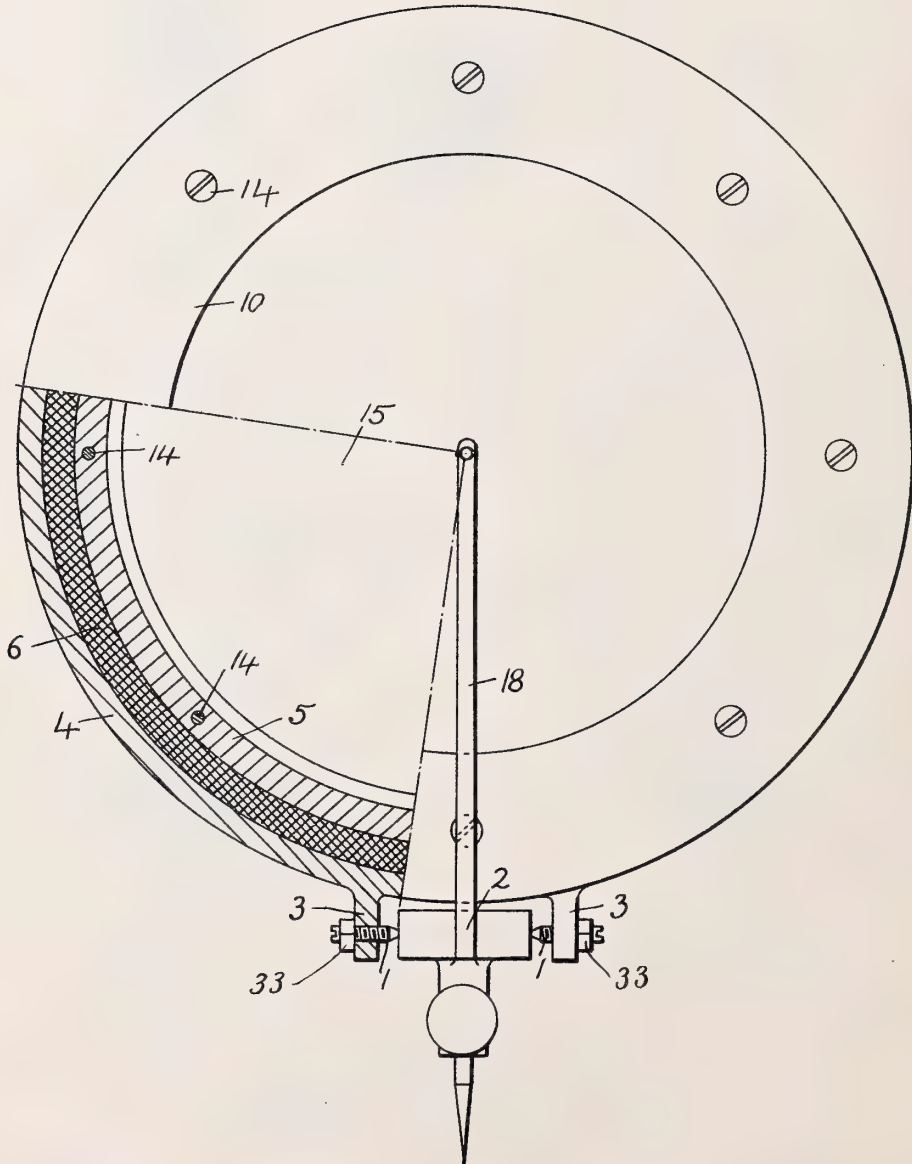
APPLICATION FILED MAR. 13, 1914.

1,202,520.

Patented Oct. 24, 1916.

4 SHEETS—SHEET 2.

Fig. 2.



WITNESSES
L. E. Barry
L. H. Schmidt

INVENTOR
JOSE HOFFAY,
BY Munn & Co.

ATTORNEYS.

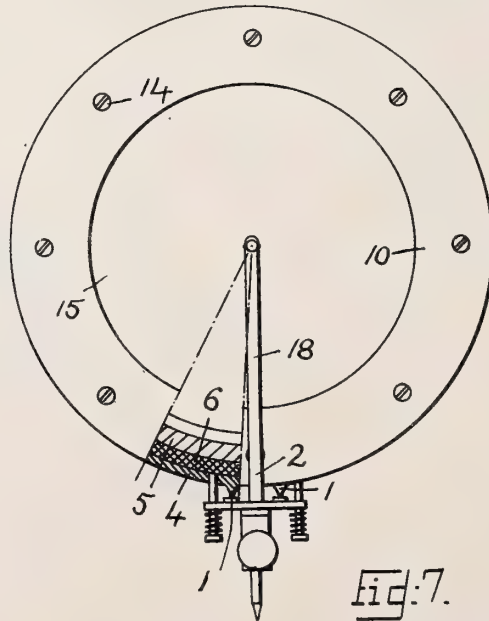
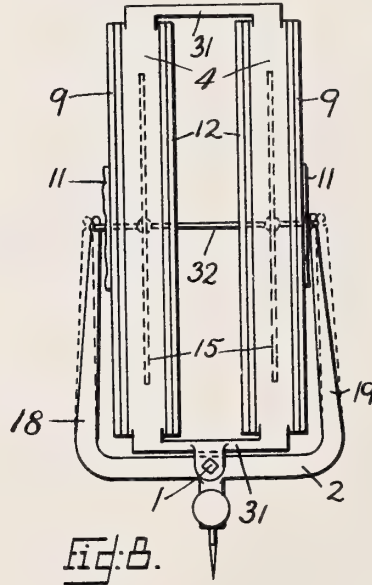
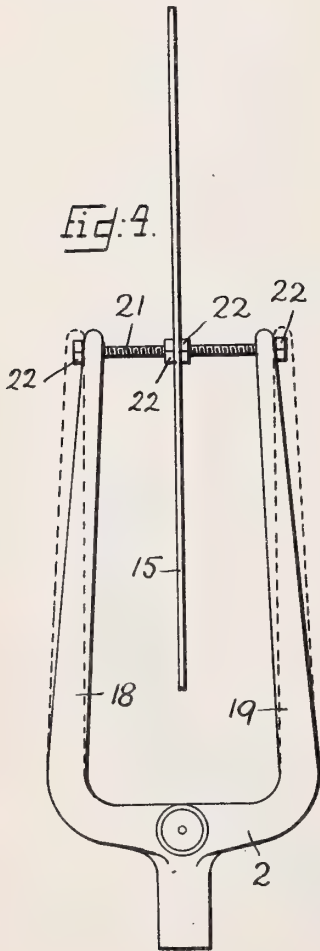
J. HOFFAY.
SOUND BOX.

APPLICATION FILED MAR. 13, 1914.

1,202,520.

Patented Oct. 24, 1916.

4 SHEETS—SHEET 3.



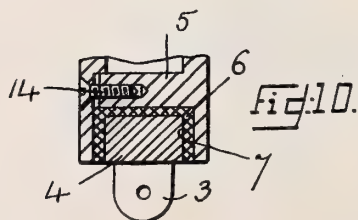
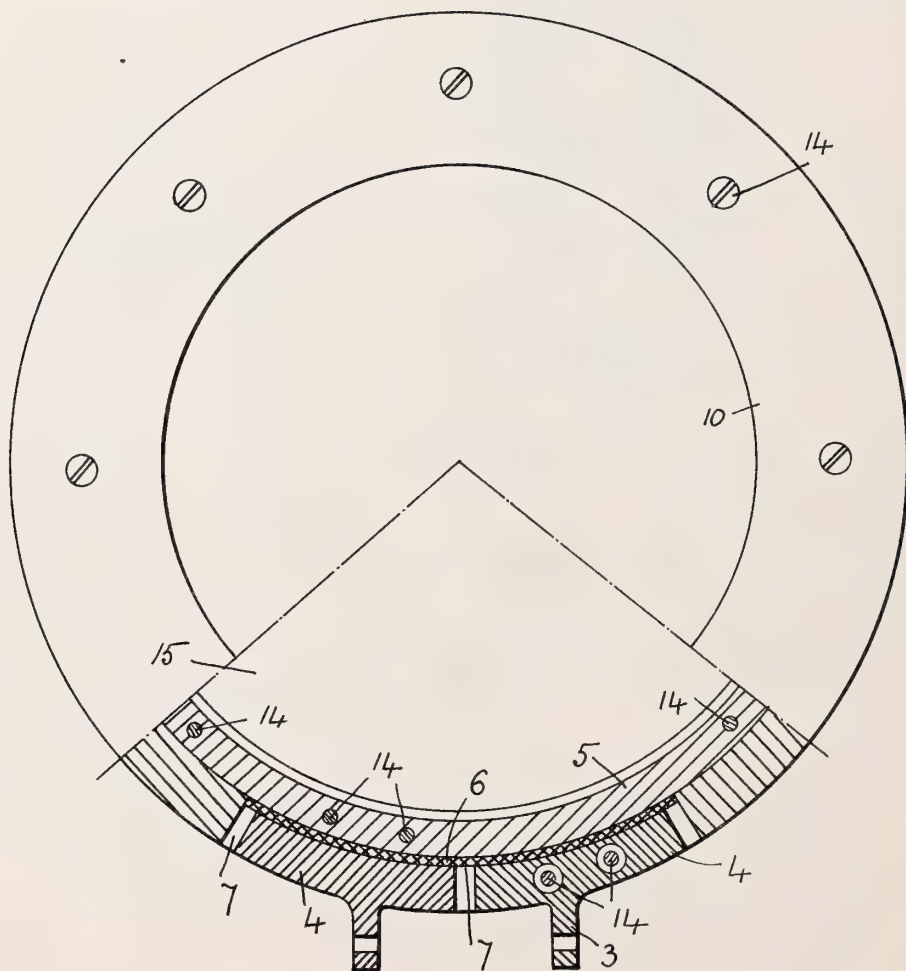
WITNESSES
A. E. Barry
L. H. Schmidt

INVENTOR
JOSE HOFFAY,
BY *Munn & Co.*
ATTORNEYS.

1,202,520.

Patented Oct. 24, 1916.
4 SHEETS—SHEET 4.

Fig. 9.



WITNESSES
F. B. Barry
L. H. Schmidt

INVENTOR
JOSE HOFFAY,
BY Munn & Co.
ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOSE HOFFAY, OF LONDON, ENGLAND.

SOUND-BOX.

1,202,520.

Specification of Letters Patent. Patented Oct. 24, 1916.

Application filed March 13, 1914. Serial No. 824,444.

To all whom it may concern:

Be it known that I, JOSE HOFFAY, a citizen of the Republic of Mexico, and a resident of London, England, have invented certain new and useful Improvements in Sound-Boxes; and I do hereby declare the following to be a full, clear, and exact description of the same.

This invention relates to improvements in sound boxes or the like for gramophones, phonographs and the like machines wherein the supporting means on which the stylus lever oscillates is insulated by rubber or other insulating means from the casing of the sound box. Such insulation is not *per se* new but the improvements constituting my invention are more particularly hereinafter indicated.

My invention is illustrated in connection with stylus levers made of a forked formation, the bifurcations straddling the diaphragm, which form the subject matter of other applications for Letters Patent, but my invention is not limited to the use of a forked stylus lever and covers the use of any suitable form of stylus lever in combination with my improved insulating means.

My invention consists in forming or mounting the pivots or bearings about which the stylus lever oscillates on a carrier which is itself rigid and is preferably a complete ring though it may be part of a ring. This ring or part of a ring is insulated from the sound box by a ring or part ring of rubber or similar insulating material surrounding the sound box and the tension of this insulator is preferably adjustable. The carrier thus forms a floating ring or section of ring thoroughly insulated from the sound box while at the same time the adjustment of the stylus lever on its rigid carrier can be readily made.

My invention is illustrated by way of example in connection with bifurcated stylus levers in the accompanying drawings, in which:—

Figure 1 is a transverse section of one construction of sound box; Fig. 2 is a face view thereof, the left hand bottom quadrant being in section on 2—2, Fig. 1; Fig. 3 is an enlarged diagrammatic sectional plan of a detail, on 3—3, Fig. 1; Fig. 4 is an elevation of a modification; Fig. 5 is a transverse section partly in side elevation of another

modification; Fig. 6 is a transverse section of another modification; Fig. 7 is a face view, partly in section, of another modification; Fig. 8 is an elevation of another modification; Fig. 9 is a face view partly in section of another modification; Fig. 10 is a transverse section of a detail.

The pivots, 1, on which the stylus lever, 2, oscillates, may be mounted in brackets, 3, integral with a carrier, 4, applied to the casing, 5, of the sound box (Fig. 2), or directly on the carrier (Fig. 7). The carrier is preferably in the form of a ring surrounding the casing, 5, (Fig. 2). Or, may be in the form of a part or parts of a ring not completely surrounding the casing (Fig. 9).

The carrier is insulated from the casing, 5, by an insulator, 6, preferably a rubber or the like ring fitting around the casing, (Fig. 2). Or, the insulator may consist of an incomplete ring not completely surrounding the casing (Fig. 9). The carrier in order to prevent lateral movement or creeping may be located in a peripheral channel, 7, in the insulator, 6, (Figs. 1 and 10); or may engage with lugs, 8, (Fig. 6) on the insulator.

By constructing the insulator as described, it presents a large area in contact with the casing and with the carrier, and owing to this the insulating action is not concentrated at any one point but is distributed to many points. Soft rubber may be employed to prevent to a maximum extent harmful transference of vibratory action as well as a rigid connection between the rigid carrier and the sound box casing, while presenting sufficient rigidity to the fulcrum of the stylus lever which is so indispensable in order to obtain large volume and faithfulness of sound reproduction. The insulator may be held in place by a flange on the back, 9, of the casing, and a front ring, 10, in which case the back of the casing is formed or provided with the usual tubular extension, 11, for connection to the tone arm, trumpet or the like, (Fig. 1) or, by a flange on the front, 12, of the casing and a back disk, 13, formed or provided with the usual tubular extension, 11, (Fig. 5). Screws, 14, may be used for connecting the parts, 9 and 10, or 12 and 13, and adjusting the compression of the insulator to the degree of firmness to give the best results. These

screws may pass through the carrier without contact therewith (Fig. 9 right hand side). The usual diaphragm, 15, may conveniently be located by rubber or the like gaskets, 16, which may be held by the parts, 9 and 10, or 12 and 13.

The pivots, 1, may be adjusted to best suit working requirements (Fig. 2) and secured by lock nuts 33, or the bearings on the stylus lever may be independently adjusted against the pivots for such purpose (Fig. 7), in known manner.

The stylus lever as illustrated comprises two bifurcations, 18, 19, which straddle the diaphragm, one on the outer side, and the other on the inner side and passing through an opening, 20, in the tubular extension, 11, without contact therewith. The bifurcations on opposite sides are connected to the diaphragm and to one another under stress by means preferably passing through the diaphragm. The bifurcations may be kept under stress by means such as a bolt and nuts, 21, 22, (Fig. 4), pulling or tying them toward one another to the relative positions shown in full lines, from what would be their natural unrestrained relative positions shown in dotted lines. Or, the bifurcations may be kept under stress by means such as a bolt and nuts, 23, 24, (Fig. 5), splaying or strutting them apart from what would be their natural relative positions shown in dotted lines. The bifurcations may be insulated from the diaphragm, by making the connectors of wood or the like insulating substance, or in other suitable manner.

In lieu of rigid means for connecting the bifurcations to the diaphragm, flexible inelastic means, preferably of an insulating nature, such as a taut silk, hemp, jute or other cord or the like, 25, (Fig. 1), may be employed. The cord may conveniently be formed as an endless plain or twisted loop engaging notches, 26, in the bifurcations as shown in Fig. 3, and knotted and waxed at 27. The cord may be secured to the diaphragm by another loop or cord, 28, knotted and waxed, at 29, on one side, of the diaphragm, embracing the loop, 25, at its mid-length, and knotted and waxed at 30, on the other side of the diaphragm.

The insulation of the carrier and stylus lever from all metallic connection with the diaphragm and the rest of the sound box is of advantage in eliminating all metallic sound.

In the modification represented in Fig. 8, a forked stylus lever is represented for operating two diaphragms. The diaphragms are mounted in sound boxes which are duplicates of that represented in Fig. 5, and may be connected to a trumpet or trumpets in any convenient manner. The sound boxes are arranged facing one another and may be spaced apart by a yoke

or yokes, 31, made fast to the two carrier rings, 4. The forked stylus lever is pivoted on one of the yokes, at 1, and the bifurcations, which are under stress extend, on the inner sides of the diaphragms through the tubular extensions, 11, and are connected to the diaphragms by a connector, 32, preferably passing through both diaphragms.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In sound recording or reproducing means, in combination, a sound box, a rigid carrier at the periphery of the sound box, a layer of insulating material separating the carrier from the sound box in a lateral direction as well as in a radial direction so that the carrier is a floating carrier, a stylus lever, and rigid means on the carrier supporting the stylus lever with facility of oscillating freely without contact with and independently of the insulator.

2. In sound recording or reproducing means, in combination, a sound box, an annular rigid carrier surrounding the sound box, an annulus of insulating material separating the carrier from the sound box so that the carrier is a floating carrier, a stylus lever, and rigid means on the carrier supporting the stylus lever with facility of oscillating freely without contact with and independently of the insulator.

3. In sound recording or reproducing means, in combination, a sound box, a rigid carrier at the periphery of the sound box, a layer of insulating material separating the carrier from the sound box, means for independently adjusting the insulator in a direction transverse to the plane of the sound box, a stylus lever, and rigid means on the carrier supporting the stylus lever with facility of oscillating freely without contact with and independently of the insulator.

4. In sound recording or reproducing means, in combination, a sound box, a rigid carrier at the periphery of the sound box, a layer of insulating material separating the carrier from the sound box in a lateral direction as well as in a radial direction and supporting the carrier on the sound box, a stylus lever, and rigid means on the carrier pivotally supporting the stylus lever with facility of oscillating freely without contact with and independently of the insulator, said pivotal supporting means being of an independently adjustable nature.

5. In sound recording or reproducing means, in combination, a sound box, a rigid carrier at the periphery of the sound box, a layer of insulating material separating the carrier from the sound box in a lateral direction as well as in a radial direction, rigid brackets integral with the carrier, rigid pivots adjustably supported by the brackets and adapted to support a stylus lever with facility of oscillating freely without contact

with and independently of the insulator, and means for locking the pivots in position.

6. In sound recording or reproducing means, in combination, a sound box, a rigid carrier, means composed of insulating material separating the carrier from the sound box and supporting the carrier on the sound box, a stylus lever, rigid means on the carrier pivotally supporting the stylus lever with facility of oscillating freely without contact with and independently of the insulator, said pivotal supporting means being of an independently adjustable nature, and means for independently adjusting the insulator in a direction transverse to the plane of the sound box.

7. In sound recording or reproducing means, in combination, a sound box, a rigid carrier at the periphery of the sound box, a layer of insulating material separating the carrier from the sound box, and engaging the carrier so as to bodily obstruct its lateral displacement, a stylus lever, and rigid means on the carrier supporting the stylus lever with facility of oscillating freely without contact with and independently of the insulator.

8. In sound recording or reproducing means, in combination, a sound box, a rigid carrier at the periphery of the sound box, a layer of insulating material separating the carrier from the sound box and engaging the carrier so as to bodily obstruct its lateral and circumferential displacement, a stylus lever, and rigid means on the carrier supporting the stylus lever with facility of oscillating freely without contact with and independently of the insulator.

9. In sound recording or reproducing means, in combination, a sound box, a rigid carrier at the periphery of the sound box, a

layer of insulating material separating the carrier from the sound box, a ring and a flange on the sound box for locating the insulator, a stylus lever, and rigid means on the carrier supporting the stylus lever with facility of oscillating freely without contact with and independently of the insulator.

10. In sound recording or reproducing means, in combination, a sound box, a rigid carrier surrounding the sound box, a ring of insulating material between the sound box and the carrier and serving to insulate the carrier from the sound box and to engage the carrier against displacement, a ring and a flange on the sound box serving to locate and adjust the pressure of the insulator, a stylus lever, and rigid means on the carrier supporting the stylus lever with facility of oscillating freely without contact with and independently of the insulator.

11. In sound recording or reproducing means, in combination, a sound box, a rigid carrier at the periphery of the sound box, a layer of insulating material of channel-shaped cross section between the sound box and the carrier and engaging the sides of the carrier and serving to insulate the carrier from the sound box and to prevent it from lateral displacement, and members on the sound box serving to locate and adjust the pressure of the insulator, a stylus lever, and rigid means on the carrier supporting the stylus lever with facility of oscillating freely without contact with and independently of the insulator.

In testimony whereof I affix my signature in presence of two subscribing witnesses.

JOSE HOFFAY.

Witnesses:

ALFRED DAY,
WALTER DAY.

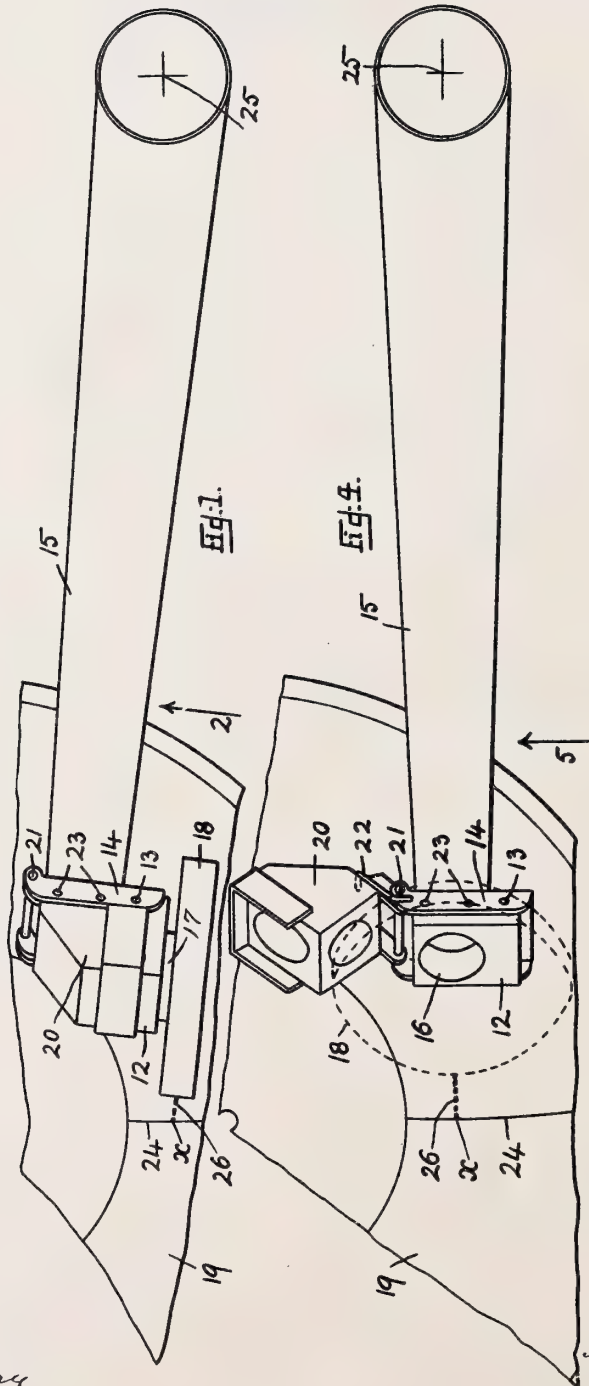
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

GRAMOPHONE AND THE LIKE MACHINE,
#1,202,521-----J. Hoffay,
Patented-October 24th, 1916.
Filed-May 1st, 1914.

J. HOFFAY.
GRAMOPHONE AND THE LIKE MACHINE.
APPLICATION FILED MAY 1, 1914.

Patented Oct. 24, 1916.
2 SHEETS—SHEET 1.

1,202,521.



Witnesses

F. C. Barry
E. M. Callaghan

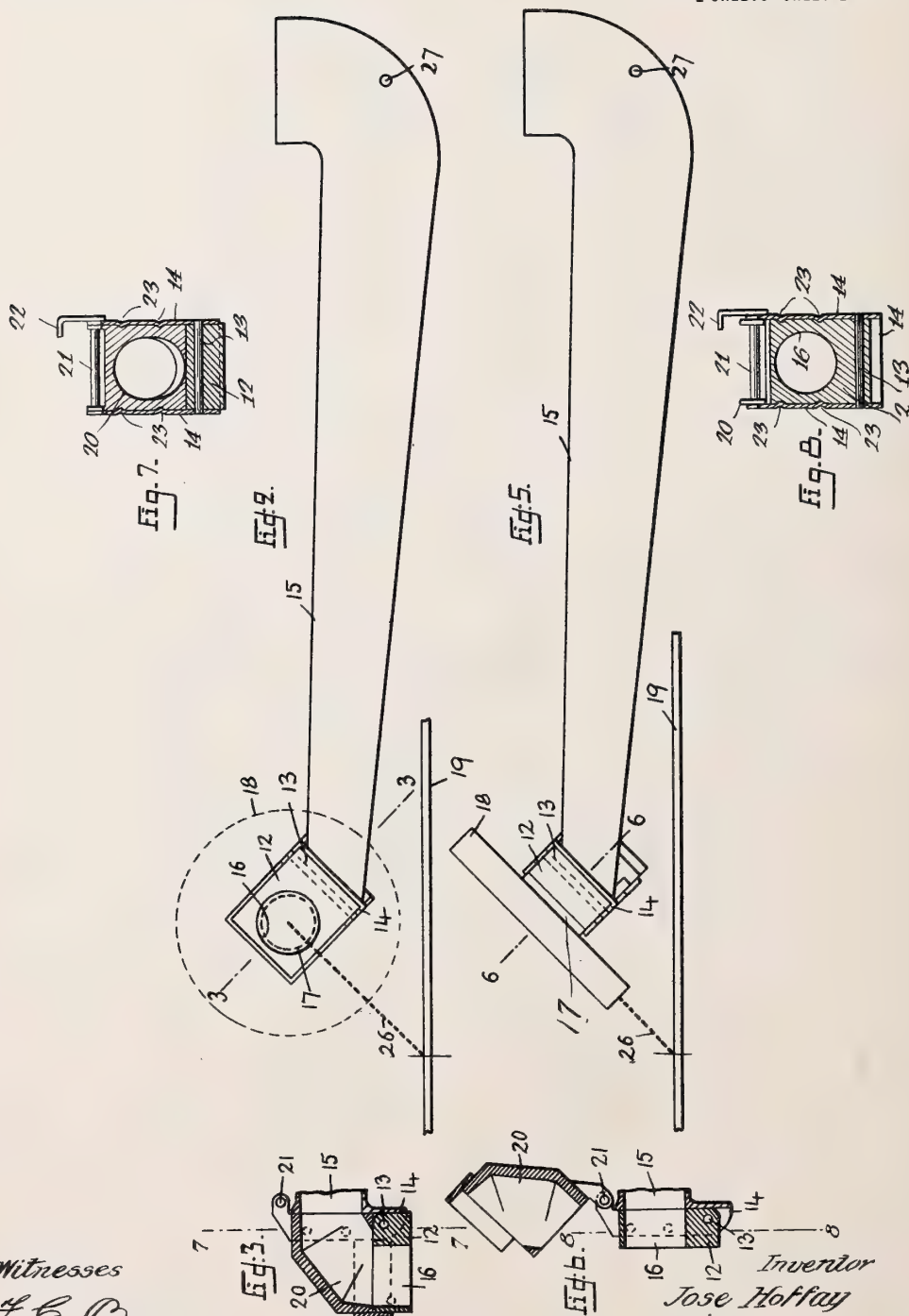
Inventor
Jose Hoffay

By *Munn & Co.*
Attorneys

J. HOFFAY.
 GRAMOPHONE AND THE LIKE MACHINE.
 APPLICATION FILED MAY 1, 1914.

1,202,521.

Patented Oct. 24, 1916.
 2 SHEETS—SHEET 2.



Witnesses
 L. B. Barry
 C. M. Callaghan

Inventor
 Jose Hoffay
 By Munn & Co.
 Attorneys

UNITED STATES PATENT OFFICE.

JOSE HOFFAY, OF LONDON, ENGLAND.

GRAMOPHONE AND THE LIKE MACHINE.

1,202,521.

Specification of Letters Patent.

Patented Oct. 24, 1916.

Application filed May 1, 1914. Serial No. 835,649.

To all whom it may concern:

Be it known that I, JOSE HOFFAY, a citizen of the Republic of Mexico, and a resident of London, England, have invented certain new and useful Improvements in Gramophones and the like Machines; and I do hereby declare the following to be a full, clear, and exact description of the same.

This invention relates to improvements in or relating to the mounting of sound boxes in gramophones, phonographs and the like machines.

The invention consists in a coupling comprising a hollow block or member, permanently or detachably connected to the sound box or the tone arm or sound tube and pivoted on the tone arm or sound tube or on a support thereon, preferably at a point outside the sound passage adapted to present an opening facing forwardly, approximately in the direction of the sound groove, or facing laterally transversely to the sound groove, for connecting the sound box to the tone arm or the like, the hollow block or member being adapted, in one position, to complete a tight communication between the sound box and the tone arm or the like, and, in another position, to break the communication, and displaceable means being provided for restoring the communication when so broken and at such time aiding in securing the hollow block or member in position.

The invention is represented, by way of example, in the accompanying drawings, in which;—

Figure 1 is a plan view of my improved device; Fig. 2 is a side elevation thereof, looking in the direction of the arrow 2 shown in Fig. 1; Fig. 3 is a detail sectional view taken on the line 3—3 shown in Fig. 2; Fig. 4 is a plan view of the device shown in Fig. 1; Fig. 5 is a side elevation looking in the direction of the arrow 5 shown in Fig. 4; Fig. 6 is a detail sectional view taken on the line 6—6 shown in Fig. 5; Fig. 7 is a detail sectional view taken on the line 7—7 shown in Fig. 3; and Fig. 8 is a detail sectional view taken on the line 8—8 shown in Fig. 6.

In carrying out the invention the coupling may, as shown in Figs. 1 to 6, comprise a block or member, 12, pivotally mounted, at 13, in a casing, 14, on the end of the tone arm, 15. The block is formed with a bore, 16, extending therethrough for receiving

the hollow boss, 17, of the sound box, 18. The pivot is disposed at one side of the center of the passage through the tone arm so that by turning the block outward to the position shown in Fig. 3, the bore, 16, is directed laterally for holding the sound-box, 18, approximately in the direction of the sound groove in the record, 19, *vide* Fig. 1; and so that by turning the block inward to the position shown in Fig. 6, the bore, 16, is directed forwardly for holding the sound-box transversely to the sound groove, *vide* Fig. 4.

A complementary hollow elbow-piece, cover, or equivalent means, 20, is pivotally mounted, at 21, in the casing, 14, at the other side of the tone arm, so that when the block, 12, is in the outward position shown in Fig. 3, bearing against the casing, 14, which serves as a stop, the elbow-piece, 20, may be turned inward as shown to complete the communication between the sound-box and the tone arm and aid in securing the block, 12, rigidly in position, by serving as a rigid obstruction between the casing, 14, and the block, 12. When the block, 12, is in the inward position shown in Fig. 6, the elbow-piece is turned outward clear of the other parts. The elbow-piece may be turned outward against one angularly bent end, serving as a stop, of a piece of spring wire, 22, the other end of which is secured to the casing, 14.

The block, 12, and the elbow-piece, 20, may be secured in their respective inward positions by detents, 23, on the casing, 14. The detents, 23, consist of inward projections on the sides of the casing, 14, and they operate by engaging in indents, in the sides of the elbow-piece, 20, and in the sides of the block, 12, as shown in Figs. 7 and 8. The detents, 23, being formed on the thin sides of the casing, 14, may be sprung outward to permit the elbow-piece, 20, and the block, 12, to be moved by hand when desired.

The same distance between the stylus point and the vertical axis or support of the tone arm, for the two positions of the sound box, may be obtained by disposing the pivot, 13, more or less to the side of the center of the passage through the tone arm, and by making the width of the block in the direction of its bore less than the length of the block transversely thereto.

24 represents a given distance on the sound record, from the vertical axis, 25, of

the tone arm, and the heavy dotted line, 26, represents the stylus lever and stylus. It will be seen in Figs. 1 and 4 that the stylus working position, *x*, is the same both for
 5 zig-zag and for hill-and-dale records.

The sound box boss may be secured in the block, 12, by a set screw or in any other convenient manner, and it is only necessary to turn the block in the casing, as shown in
 10 Fig. 6, and then move the elbow piece out of the way, or at right angles to the casing, as shown in Fig. 3; thereafter moving the elbow piece to restore communication, thereby adjusting the sound box for playing records of different cuts according to require-
 15 ments.

27 is the pivot of vertical oscillation of the tone arm.

In the claims, the term "tone arm" is intended, besides any special signification it may have, to comprehend any form of articulated or non-articulated sound tube, horn, or other sound conveying means.

What I claim as my invention and desire
 25 to secure by Letters Patent is:—

1. In a gramophone, in combination, a sound box, a tone arm, a support on the tone arm, a hollow member pivoted on said support and adapted in one position to complete a tight communication between the
 30 sound box and the tone arm and in another position to break such communication, a single displaceable member for restoring such communication when so broken and at such
 35 time aiding in securing said hollow member in position by serving as a rigid obstruction between said support and said hollow member, and means for keeping said movable members in the positions desired.

2. In a gramophone, in combination, a sound box, a tone arm, a support on the tone arm, a hollow member pivoted on said support and adapted to present an opening facing forwardly approximately in the direction of the sound groove of the record,
 45 or facing laterally transversely to the sound groove of the record, the hollow member being adapted to complete a tight communication between the sound box and the tone arm
 50 in one position, and to break such communication in another position, a single displaceable member for restoring such communication when so broken and at such time
 55 aiding in securing said hollow member in position by serving as a rigid obstruction between said support and said hollow member, and means for keeping said movable members in the positions desired.

3. In a gramophone, in combination, a sound box, a tone arm, a support on the tone arm, a hollow member pivoted on said support at a point outside the sound passage
 60 and the ordinary thickness of the walls thereof, and adapted in one position to complete a tight communication between the

sound box and the tone arm and in another position to break such communication, a single displaceable member for restoring such communication when so broken and at such time aiding in securing said hollow member
 70 in position by serving as a rigid obstruction between said support and said hollow member, and means for keeping said movable members in the positions desired.

4. In a gramophone, in combination, a sound box, a tone arm, a support on the tone arm, a hollow member pivoted on said support and adapted in one position to complete a tight communication between the
 75 sound box and the tone arm and in another position to break such communication, a single pivotally mounted member for restoring such communication when so broken and at such time aiding in securing said hollow
 80 member in position by serving as a rigid obstruction between said support and said hollow member, and means for keeping said pivotally mounted members in the positions desired.

5. In a gramophone, in combination, a sound box, a tone arm, a support on the tone arm, a hollow member pivoted on said support and adapted in one position to complete a tight communication between the sound
 85 box and the tone arm and in another position to break such communication, pivotally mounted means for restoring such communication when so broken and which at such time aid in securing said hollow member in position but which may be turned outward
 90 clear away from between said hollow member and the tone arm when not required for use, and means for keeping said pivotally mounted members in the positions desired.

6. In a gramophone, in combination, a sound box, a tone arm, a support on the tone arm, a member having a passage, turnably mounted on said support and adapted in one position, suitable for hill-and-dale records,
 105 to complete a tight communication between the sound box and the tone arm, and in another position, suitable for horizontally zig-zag records, to break such communication, a single displaceable member for restoring such communication when so broken
 110 and at such time aiding in securing said hollow member in position by serving as a rigid obstruction between said support and said hollow member, and means for keeping said movable members in the positions
 115 desired.

7. In a gramophone, in combination, a sound box, a tone arm, a support on the tone arm, a hollow member so pivoted on said support and so constructed as to obtain the
 120 same distance between the stylus point and the vertical axis of the horn end of the tone arm, for two positions of the sound box respectively for horizontally zig-zag and hill-and-dale records, the hollow member being
 125

adapted to complete a tight communication between the sound box and the tone arm in one position, and to break such communication in another position, a single displaceable member for restoring such communication when so broken and at such time aiding in securing said hollow member in position by serving as a rigid obstruction between said support and said hollow member, and means for keeping said movable members in the positions desired.

8. Coupling means for connecting a sound box to the tone arm of a gramophone, comprising a hollow member adapted to be connected to one of said parts and to be turnably mounted on the other of said parts and to complete a tight communication therebetween in one position and to break such communication in another position, a single displaceable member for restoring the communication when so broken and at such time aiding in securing said hollow member in position by serving as a rigid obstruction between said hollow member and the part on which the latter is mounted, and means for keeping said movable members in the positions desired.

9. Coupling means for connecting a sound box to the tone arm of a gramophone, comprising a hollow member adapted to be connected to one of said parts and to be turnably mounted on the other of said parts and to complete a tight communication therebetween in one position and to break such communication in another position and further to obtain the same distance between the stylus point and the vertical axis of the horn end of the tone arm, for the two positions of the sound box for hill-and-dale and horizontally zig-zag records, a single displaceable member for restoring the communication when so broken and at such time aiding in securing said hollow member in position by serving as a rigid obstruction between said hollow member and the part on which the latter is mounted, and means for keeping said movable members in the positions desired.

10. Coupling means for connecting a sound box to the tone arm of a gramophone, phonograph, or the like machine, comprising a casing adapted to be attached to one of said parts, a hollow member adapted to be attached to the other of said parts and turnably mounted in the casing on one side of the passage through the member to which the casing is attached, and adapted to complete the communication between the sound box and the tone arm in one position and to break such communication in another position, means pivoted on the other side of said passage for completing the communication when so broken, and means for holding said movable members in the positions desired.

11. Coupling means for connecting a sound box to the tone arm of a gramophone, comprising a casing adapted to be attached to one of said parts, a hollow member adapted to be attached to the other of said parts and turnably mounted in the casing on one side of the passage through the member to which the casing is attached, and adapted to complete the communication between the sound box and the tone arm in one position and to break such communication in another position and further to obtain the same distance between the stylus point and the vertical axis of the horn end of the tone arm, for the two positions of the sound box for hill-and-dale and horizontally zig-zag records, means pivoted on the other side of said passage for completing the communication when so broken, and means for holding said movable members in the positions desired.

12. Coupling means for connecting a sound box to the tone arm of a gramophone, comprising a casing serving as a stop and adapted to be attached to one of said parts, a hollow member adapted to be attached to the other of said parts and turnably mounted in the casing and adapted to complete a tight communication between the sound box and the tone arm in one position and to break such communication in another position, a single displaceable member for restoring the communication when so broken and at such time aiding in securing said hollow member in position by serving as a rigid obstruction between said casing and said hollow member, and means for keeping said movable members in the positions desired.

13. Coupling means for connecting a sound box to the tone arm of a gramophone, comprising a casing serving as a stop and adapted to be attached to one of said parts, a hollow member adapted to be attached to the other of said parts and turnably mounted in the casing and adapted to complete a tight communication between the sound box and the tone arm in one position and to break such communication in another position and further to obtain the same distance between the stylus point and the vertical axis of the horn end of the tone arm, for the two positions of the sound box for hill-and-dale and horizontally zig-zag records, a single displaceable member for restoring the communication when so broken and at such time aiding in securing said hollow member in position by serving as a rigid obstruction between said casing and said hollow member, and means for keeping said movable members in the positions desired.

14. Coupling means for connecting a sound box to the tone arm of a gramophone, comprising a hollow member adapted to be pivotally mounted on one of said parts and to be attached to the other of said parts and adapted to complete a tight communication

therebetween in one position and to break such communication in another position, a single displaceable member for restoring the communication when so broken and at such time aiding in securing said pivotally mounted member in position by serving as a rigid obstruction between said hollow member and the part on which the latter is mounted, and means for keeping said pivotally mounted member in the positions desired.

15. Coupling means for connecting a sound box to the tone arm of a gramophone, comprising a hollow member adapted to be pivotally mounted on one of said parts and to be attached to the other of said parts and adapted to complete a tight communication therebetween in one position and to break such communication in another position and further to obtain the same distance between the stylus point and the vertical axis of the horn end of the tone arm, for the two positions of the sound box for hill-and-dale and horizontally zig-zag records, a single displaceable member for restoring the communication when so broken and at such time aiding in securing said pivotally mounted member in position by serving as a rigid obstruction between said hollow member and the part on which the latter is mounted, and means for keeping said pivotally mounted member in the positions desired.

16. In a gramophone, the combination with the tone arm, of a casing attached thereto, a sound box, a member attached to said sound box and pivoted to the casing whereby in one position a direct communication is formed between the sound box and tone arm, and in another position said communication is broken, unitary means for completing such communication when broken, and means for keeping said movable members in the positions desired.

17. In a gramophone, in combination with the tone arm, of a casing attached thereto, a sound box, a member attached to the sound box and pivoted to the casing at one side of the center of the passage of the tone arm, whereby in one position said member completes the communication between the sound box and the tone arm, and breaks such communication in another position, unitary means for completing such communication when broken, and means for keeping said movable members in the positions desired.

18. In a gramophone, the combination with the tone arm, of a casing attached thereto, a sound box, a member attached to said sound box and pivoted to the casing whereby in one position said member completes the communication between the sound box and tone arm, and in another position said communication is broken, a pivotally mounted unitary member for completing such com-

munication when so broken, and means for keeping said pivotally mounted members in the positions desired.

19. In a gramophone, the combination with the tone arm having a casing secured thereto, of a sound box, a hollow member attached to said sound box and pivoted to the casing whereby in one position said member completes the communication between the sound box and tone arm and in another position said communication is broken, pivotally mounted means for completing such communication when so broken, and which may be moved clear from the sound-box when not required for use, and means for keeping said pivotally mounted members in the positions desired.

20. In a gramophone, the combination with the tone arm, of a casing attached thereto, a sound box, a member having a through passage, attached to said sound box and pivoted to the casing, adapted in one position, to complete communication between the sound box and tone arm, and in another position to break such communication, unitary means for completing such communication when so broken, and means for holding said movable members in the positions desired.

21. In a gramophone, the combination with the tone arm, of a casing attached thereto, a sound box, a member attached to said sound box and pivoted to the casing so that the radius between said pivot and the longitudinal axis of the stylus of the sound box is substantially the same as the distance between said pivot and the center of the sound passage of the tone arm to automatically obtain the same distance between the stylus point and the vertical axis or support of the tone arm, in the alternate positions of the sound box for horizontally zig-zag and hill-and-dale records, said member being adapted to complete the communication between the sound box and the tone arm in one position, and to break such communication in another position, a unitary member for completing such communications when so broken, and means for holding said movable members in the positions desired.

22. Coupling means for connecting a sound box to the tone arm of a gramophone, comprising a casing attached to one of said parts, a member pivoted to the casing to complete a direct communication between the sound box and the tone arm in one position, and to break such communication in another position, a unitary member for restoring the communication when so broken, and means for keeping said movable members in the positions desired.

23. Coupling means for connecting a sound box to the tone arm of a gramophone, comprising a casing attached to one of said parts, a member connected to the other of

said parts, and pivoted to the casing to complete a direct communication between the sound box and the tone arm in one position, and to break such communication in another position, and pivoted to the casing so that the radius between said pivot and the longitudinal axis of the stylus of the sound box is substantially the same as the distance between said pivot and the center of the sound passage of the tone arm to automatically maintain the same distance between the stylus point and vertical axis of the tone arm in the alternate positions of the sound box for hill-and-dale and horizontally zig-zag records, a unitary member for restoring the communication when so broken, and means for keeping said movable members in the positions desired.

24. Coupling means for connecting a sound box to the tone arm of a gramophone, comprising a casing attached to one of said parts serving as a stop, a member pivoted to the casing to complete a direct communication between the sound box and the tone arm in one position, and to break such communication in another position, a pivotally mounted unitary member for restoring the communication when so broken, and means for keeping said movable members in the positions desired.

25. Coupling means for connecting a sound box to the tone arm of a gramophone, comprising a member pivoted to one of said parts, and attached to the other of said parts, whereby direct communication between the sound box and the tone arm is made in one position, and broken in another position, a pivotally mounted unitary member for restoring such communication when so broken, and means for keeping said pivoted members in the positions desired.

26. In a gramophone, in combination with the sound box, of a tone arm, a support on the tone arm, a member pivoted on said support and connected to the sound box and adapted in one position to complete a communication between the sound box and the tone arm, and in another position to break such communication, a pivotally mounted unitary member for restoring such communication when so broken and which may be turned outward clear away from between said member and the tone arm when not required for use, and means for keeping said pivotally mounted members in the positions desired.

27. In a gramophone, the combination with the tone arm having a casing secured thereto, of a sound box, a member attached to said sound box and pivoted to the casing so that the radius between said pivot and the longitudinal axis of the stylus of the sound box is substantially the same as the distance between said pivot and the center of the sound passage of the tone arm to

automatically obtain the same distance between the stylus point and the vertical axis or support of the tone arm in the alternate positions of the sound box for horizontally zig-zag and hill-and-dale records, said member being adapted to complete the communication between the sound box and the tone arm in one position, and to break such communication in another position, pivotally mounted means for completing such communication when so broken, and which may be moved clear from the sound box when not required for use, and means for keeping said pivotally mounted member in the positions desired.

28. Coupling means for connecting a sound box to the tone arm of a gramophone, comprising a casing attached to one of said parts, a member connected to the other of said parts and pivoted to the casing to complete a direct communication between the sound box and the tone arm in one position, and to break such communication in another position, a unitary member for restoring the communication when so broken, and which may be moved clear from the sound box when not required for use, and means for keeping said movable members in the positions desired.

29. Coupling means for connecting a sound box to the tone arm of a gramophone, comprising a casing detachably connected to one of said parts serving as a stop, a member connected to the other of said parts and pivoted to the casing to complete a direct communication between the sound box and the tone arm in one position, and to break such communication in another position, a pivotally mounted unitary member for restoring the communication when so broken, and which may be moved clear from the sound box when not required for use, and means for keeping said movable members in the positions desired.

30. Coupling means for connecting a sound box to the tone arm of a gramophone, comprising a member pivoted to one of said parts, and attached to the other of said parts, whereby direct communication between the sound box and tone arm is made in one position, and broken in another position, a pivotally mounted unitary member for restoring such communication when so broken, and which may be moved clear from the sound box when not required for use, and means for keeping said pivoted member in the positions desired.

31. Coupling means for connecting a sound box to the tone arm of a gramophone, comprising a casing attached to one of said parts, a member connected to the other of said parts, and pivoted to the casing to complete a direct communication between the sound box and the tone arm in one position, and to break such communication in

another position, and pivoted to the casing so that the radius between said pivot and the longitudinal axis of the stylus of the sound box is substantially the same as the
5 distance between said pivot and the center of the sound passage of the tone arm to automatically maintain the same distance between the stylus point and vertical axis of the tone arm in the alternate positions
10 of the sound box for hill-and-dale and horizontally zig-zag records, a unitary member for restoring the communication when so

broken, and which may be moved clear from the sound box when not required for use, and means for keeping said movable mem- 15 bers in the positions desired.

In testimony whereof I affix my signature in presence of two subscribing witnesses.

JOSE HOFFAY.

Witnesses:

ALFRED DAY,
WALTER DAY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

UNITED STATES PATENT OFFICE.

MOVSESS B. ADOM, OF WHITE PLAINS, NEW YORK.

COMPOSITION FOR MAKING SOUND-RECORDS.

1,202,638.

Specification of Letters Patent.

Patented Oct. 24, 1916.

No Drawing.

Application filed June 4, 1915. Serial No. 32,190.

To all whom it may concern:

Be it known that I, MOVSESS B. ADOM, a citizen of the United States, and a resident of White Plains, in the county of Westchester and State of New York, have invented a new and Improved Composition for Making Sound-Records, of which the following is a full, clear, and exact description.

My invention relates to composition of matter for sound records, and has for its object the provision of an inexpensive composition easily impressible by the needle of a sound-recording tool and which will harden after impression to such an extent as to be unaffected by the needle of a sound-reproducing instrument. The composition I prefer to use is collodion mixed with a hardener and applied to a suitable base which forms a support for the composition.

The ordinary collodion being too soft and too thin, I form it as follows: Pyroxylin is dissolved in three parts of ether mixed with one part of alcohol, to which three per cent. of Venetian turpentine is added, and also two per cent. of castor oil to make the coating consistent and flexible. To render the collodion hard as it dries, I use a soluble aluminum salt, preferably aluminum chlorid. This makes the emulsion as it sets hard and almost brittle, but not hard enough to crack if the emulsion is mounted on a flexible sup-

port. The added aluminum salt forms only one per cent. of the collodion.

The composition when formed and coated on a suitable base is easily impressible by the needle of a sound-recording instrument. The impressed coating will dry within two or three minutes under normal atmospheric conditions, but it can be dried more rapidly by subjecting it to a hot-air current or any other suitable drying means. This emulsion is primarily intended to be used in connection with a celluloid support of the type used for continuous photographic films, so as to provide a continuous sound record. It is self-evident that it can be used on any other support to which the emulsion will easily adhere. Or, means can be used for causing the adherence of this composition to the support.

I claim:

A composition for sound-recording surfaces, comprising pyroxylin, ether, alcohol, turpentine, castor oil, and aluminum chlorid in proportions substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MOVSESS B. ADOM.

Witnesses:

B. JOFFE,
PHILIP D. ROLLHAUS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

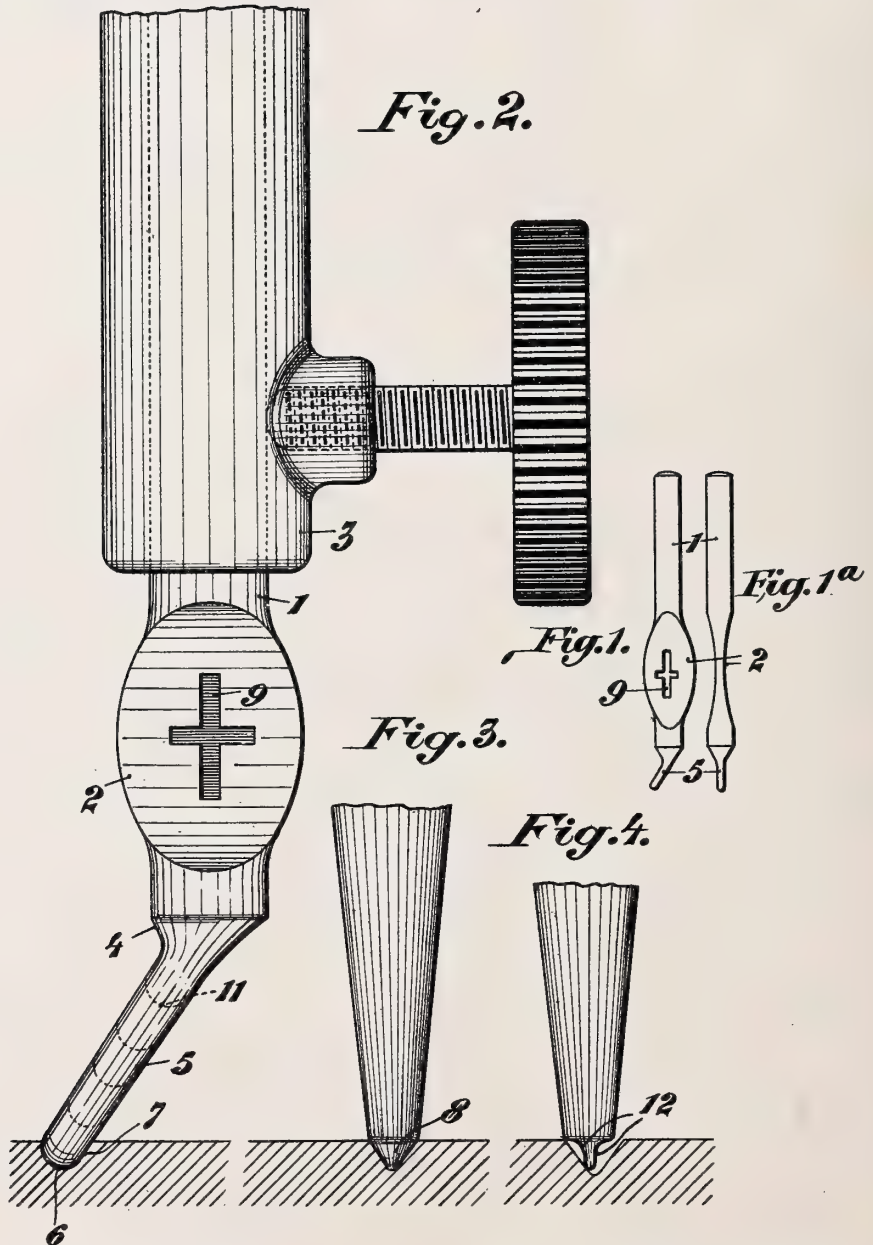
STYLUS FOR TALKING MACHINES

#1,202,739-----A. Knippenberg,
Patented-October 24th, 1916.
Filed-May 20th, 1915.

A. KNIPPENBERG.
 STYLUS FOR TALKING MACHINES.
 APPLICATION FILED MAY 20, 1915.

1,202,739.

Patented Oct. 24, 1916.



Witnesses:
Chas. Leder
M. E. McAdie.

Inventor
August Knippenberg
 by *Wm. L. Norris*
 Attorney

UNITED STATES PATENT OFFICE.

AUGUST KNIPPENBERG, OF ARNSTADT, GERMANY.

STYLUS FOR TALKING-MACHINES.

1,202,739.

Specification of Letters Patent.

Patented Oct. 24, 1916.

Application filed May 20, 1915. Serial No. 29,360.

To all whom it may concern:

Be it known that I, AUGUST KNIPPENBERG, a subject of the German Emperor, residing at Arnstadt, Thuringia, Germany, have invented certain new and useful Improvements in Styli for Talking-Machines, of which the following is a specification.

The present invention relates to improvements in styluses for talking machines, and more especially to those used in connection with the disk records of gramophones.

According to the present invention, the stylus embodies an operative portion which is cylindrical and the bottom or end of which is rounded, the angle of the bend lying in a plane transverse to the direction of the sound-groove in the disk, the slanting position of the cylindrical portion of the stylus causing it to present to one side wall of the sound-groove a bearing surface of greater extent than that presented to the sound-groove by the opposite side of the stylus, wear of the groove in the disk and stylus being thus minimized, resulting in increasing the durability of both the stylus and the records.

A further feature of the invention consists in providing the stylus with means for insuring its correct insertion into the stylus holder in order that the stylus will be accurately positioned relatively to the record.

It is well known that styluses of the kinds ordinarily used for talking machines present the objection that they can be used in the reproduction of only one or two records. Repeated efforts to produce more durable styluses have proved unsuccessful, because of the fact that styluses as usually shaped and positioned wear off more at the sides thereof than at their ends. Moreover, the ordinary styluses do not possess the necessary strength to transmit the sound-waves to the diaphragm, owing to the fact that their points must be as narrow as the sound-groove in the disk. A stylus of this character which is worn off at the side allows play of the stylus laterally in the sound-groove, producing discords and noises, and it unduly wears and destroys the sound-groove in the disk.

A stylus embodying the present invention on the contrary always presents substantially the same contact surface to the walls of the sound-groove of the gramophone disk. The shape of the rounded point does not change to any appreciable degree. While,

when often used, the stylus is ground off at the end, which has the effect of shortening its length, it maintains the same characteristic engagement with the groove of the disk, and because of the fact that the side of the stylus toward the periphery of the disk has a surface of increased area to engage the corresponding wall of the sound-groove in the disk, a good contact between these parts is maintained and lateral play or rattling of the stylus in the groove is prevented. Fineness in tone and delicacy of reproduction are thereby attained. The stylus shapes itself in accordance with the shape of the sound-grooves in the disk and it maintains good contact therewith. Owing to its great bearing surface, its wear is considerably diminished. The stylus is sufficiently rigid to transmit, through its slanting cylindrical portion, the tones to the diaphragm, notwithstanding its sensitiveness. The slope of the cylindrical portion of the stylus may vary within certain limits.

For the purpose of insuring correct application of the stylus to the holder, the stem of the stylus is provided with a flattened or widened surface, which surface is preferably provided with a mark for indicating the correct position of the stylus in the holder to present the stylus in proper relation to the gramophone disk.

An embodiment of a stylus for talking machines constructed in accordance with the present invention is shown in Figures 1 and 2 of the accompanying drawing.

Fig. 1 shows the stylus in coöperative relation with a record disk of a gramophone. Fig. 1^a shows the stylus as viewed from one side in Fig. 1. Fig. 2 shows the stylus, on a larger scale, fitted into its holder and in coöperative relation with a record disk. Figs. 3 and 4 represent styluses of a type heretofore used having a conical point, Fig. 4 showing the wear and the resulting deformation of the point.

The stylus in that embodiment of the invention shown comprises a stem or shank 1, the upper portion of which is adapted to be clamped in the stylus holder 3, the stem being provided at an intermediate point with a widened or flattened web 2 for the purpose of insuring proper application of the stylus in the holder. The stem tapers off into a cone 4, it thence continuing as a cylindrical part 5 which has an inclination at an obtuse angle of, for example, 150°

to 160°. Owing to the slanting position of the cylindrical portion, the stylus is, to some degree, resilient vertically, thereby enabling the stylus to easily follow the undulations in the sound-groove of the disk. The point or lower end 6 of the cylindrical part of the stylus is rounded off, as shown in Fig. 2. Because of the slanting position of the cylindrical part 5, the stylus presents at the side 7 thereof (the right-hand side in Fig. 2) a greater bearing surface to the respective side of the groove of the disk than that presented by the other side of the stylus, and this insures a perfect guiding of the stylus in the groove of the disk.

The ordinary styluses for talking machines having a conical point 8 (Fig. 3) cut or unduly wear the groove in the record disks, and also the styluses wear off in an uneven manner, as shown at 12 in Fig. 4, this wear of the ordinary type of stylus being due not only to the engagement of the sides of the stylus with the side walls of the sound-groove of the record but also to the force applied by the groove in the disk to the stylus to shift the stylus and the relatively heavy tone arm and sound-box toward the center of the disk as the stylus follows the spiral sound-groove. In consequence of this wear, such styluses continually play or chatter in the groove of the disk, the wear of the stylus and the walls of the grooves in the disk being rapid, producing noises and discords and rendering the life of the record disks short. These defects are avoided by the present invention.

In order to enable the stylus to be easily and quickly set in correct position in its holder, the front side of the stylus is provided with the widened or flattened face 2 which is preferably provided with an indicating mark 9.

The dotted lines 11 in Fig. 2 show dia-

grammatically the gradual wear of a stylus embodying the present invention having an oblique, cylindrical part 5. The wear merely shortens the length of the stylus without appreciably changing its shape, and such wear may be continued until it reaches the cone. The line 12 in Fig. 4 shows the quick, uneven, lateral wear of a stylus of the ordinary type when used for only one record disk, such wear rendering the stylus useless for further reproduction.

I claim:—

1. A stylus for use with gramophone records having a cylindrical portion bent laterally relatively to the length of the sound-groove in the record at the point of engagement of the end of the bent portion therein.

2. A stylus for use with gramophone records having a cylindrical bent portion inclined relatively to the surface of the record and disposed transversely of the sound-groove at the point of contact of the bent portion therewith, the end of said bent portion being rounded to operate in the sound-groove in the record.

3. A stylus for use with gramophone records, said stylus having a cylindrical portion bent laterally with respect to the sound-groove in the record at the point of contact of the stylus therein and having a widened portion occupying a predetermined relation to the laterally bent portion of the stylus for insuring correct positioning of the bent portion of the stylus relatively to the sound-groove in the record.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

AUGUST KNIPPENBERG.

Witnesses:

OSKAR HEIMANN,
ERNST EBERHARDT.

DEVICE FOR USE IN THE MANUFACTURE OF
GRAMOPHONE, PHONOGRAPH, AND THE LIKE
SOUND BOXES,

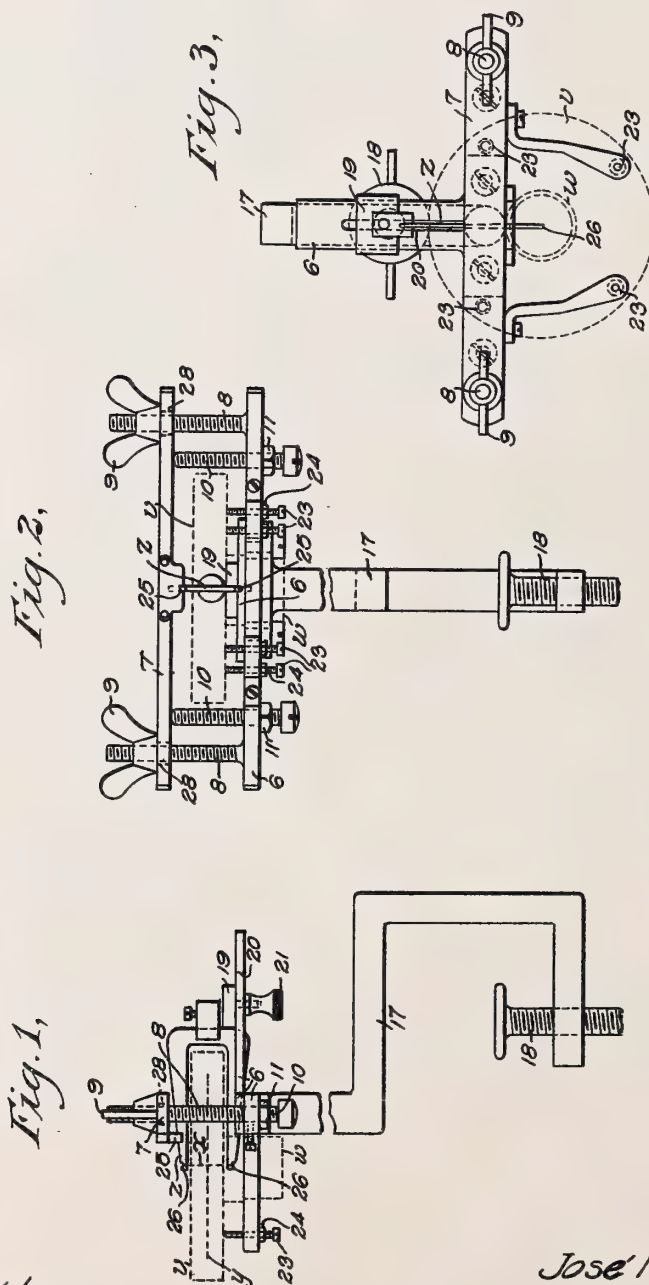
#1,202,843-----J. Hoffay,
Patented-October 31st, 1916.
Filed-August 7th, 1915.

J. HOFFAY.
 DEVICE FOR USE IN THE MANUFACTURE OF GRAMOPHONE, PHONOGRAPH, AND THE LIKE SOUND BOXES.
 APPLICATION FILED AUG. 7, 1915.

1,202,843.

Patented Oct. 31, 1916.

2 SHEETS—SHEET 1.



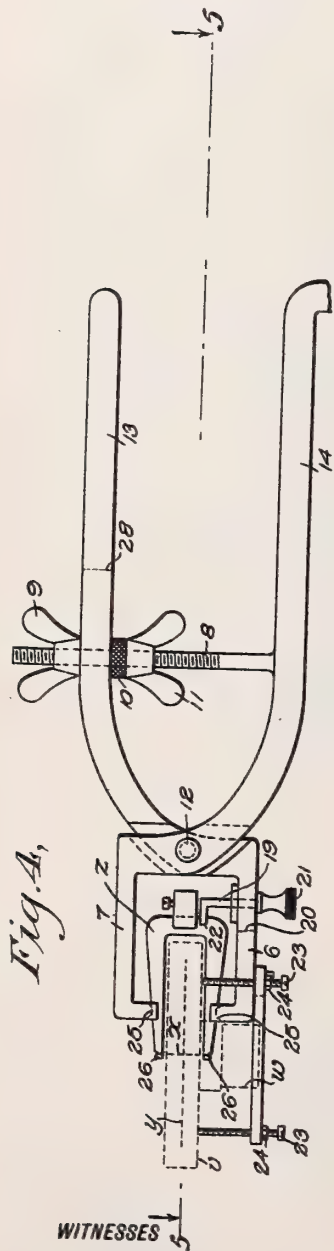
WITNESSES
 Edw. Thorpe
 J. C. Larkin

INVENTOR
 Jose Hoffay
 BY *Mumford*
 ATTORNEYS

J. HOFFAY.
 DEVICE FOR USE IN THE MANUFACTURE OF GRAMOPHONE, PHONOGRAPH, AND THE LIKE SOUND BOXES.
 APPLICATION FILED AUG. 7, 1915.

1,202,843.

Patented Oct. 31, 1916.
 2 SHEETS—SHEET 2.



WITNESSES
 Edw. Thorpe
 J. C. Larsen

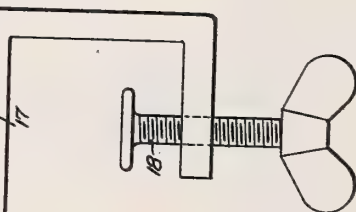


Fig. 5.

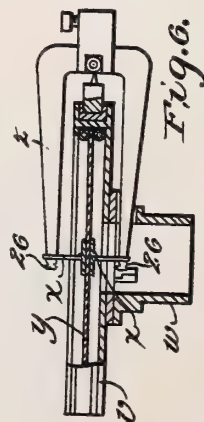
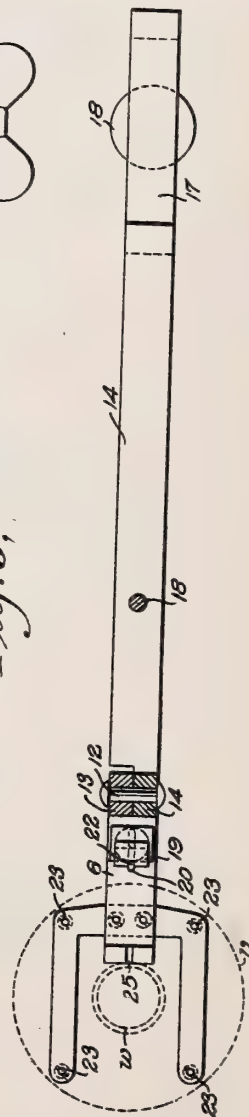


Fig. 6.



INVENTOR
 Jose Hoffay
 BY Munn & Co.
 ATTORNEYS

UNITED STATES PATENT OFFICE.

JOSEPH HOFFAY, OF NEW YORK, N. Y.

DEVICE FOR USE IN THE MANUFACTURE OF GRAMOPHONE, PHONOGRAPH, AND THE LIKE SOUND-BOXES.

1,202,843.

Specification of Letters Patent.

Patented Oct. 31, 1916.

Application filed August 7, 1915. Serial No. 44,280.

To all whom it may concern:

Be it known that I, JOSÉ HOFFAY, a citizen of the Republic of Mexico, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Device for Use in the Manufacture of Gramophone, Phonograph, and the like Sound-Boxes, of which the following is a full, clear, and exact description.

In my copending application filed on the 4th day of April, 1915, Serial No. 10,698, are described certain improvements in sound boxes or the like for gramophones, phonographs and the like machines having the stylus lever made of a forked formation and keeping under continuous tension or compression means, preferably passing through the diaphragm, connecting the bifurcations to the diaphragm and to each other.

The present invention relates to means for temporarily subjecting and holding the bifurcations of such a forked stylus lever under predetermined stress, while the permanent connecting means are being applied to the bifurcations, without liability of unduly straining or damaging the stylus lever.

To this end, the invention consists in a clamping device, preferably made of tool steel, provided with a fixed or adjustable gage for controlling the clamping action, and with a second fixed or adjustable gage for holding the stylus lever against longitudinal displacement, and if desired, with means for supporting the sound box in position in relation to the stylus lever so as to leave both hands of the assembler free.

Embodiments of the invention are illustrated, by way of example, in the accompanying drawings, in which—

Figures 1 and 2 are elevations at right angles to one another; Fig. 3 is a plan, of one form of device; Figs. 4 and 5 are an elevation and a sectional plan of a modified form of device; and Fig. 6 is a sectional view of a sound box having a forked stylus lever and with which my present invention is employed.

Like or equivalent parts in the drawings are indicated by similar reference numerals.

The device comprises two opposite clamping members or jaws, 6, 7.

In Figs. 1 to 3, the clamping member 7 has guide ways 28 which freely pass over screw threaded studs 8 fast on the member 6. The

clamping action is effected by winged nuts 9 on the studs 8. 10, 10, are screw threaded studs serving as gages for limiting the clamping action or approach of the members 6, 7. These gages are adjustable in the member 6 and may be locked in position by nuts 11 when desired.

In Figs. 4 and 5 the clamping members are pivoted at 12, and have rearward extensions 13, 14. The clamping action is effected by a winged nut 9 on a screw threaded stud 8, fast on the extension 14, and passing freely through a slot 28 in the extension 13. 10 is a milled nut, adjustable on the stud 8, and serving as a gage for limiting the clamping action, and 11 is a winged nut for locking the gage 10 in position, when desired.

If desired, the member 6 or extension 14 may be adapted with a vise 17—18 for holding the device in position on a work bench or table.

The parts of the members which engage the bifurcations of the stylus lever *z* are preferably grooved as at 25, and are preferably arranged so as to exert pressure on the bifurcations near to their free ends 26, when subjecting them to stress, thereby utilizing their resiliency along as much of their length as possible and minimizing possibility of damage particularly at their junction part.

A gage 19, preferably grooved as at 22 to engage the junction part of the bifurcations, is slidably mounted in a guide 20 in the member 6, and adapted to be held fast by a lock nut 21 in the position desired, which is preferably such as to cause the free ends 26 of the bifurcations to be situated in line with the central axis of the diaphragm *y*, and the connecting means *x*, when the gage 19 is engaging the stylus lever as shown, and the fixed or detachable boss *w* of the sound box casing *v* is abutting against the front face of one of the clamping members, for example, the member 6, as shown. The gage 19 may also serve as a support for the stylus lever while it is being assembled, before the pressure is exerted.

23, 23 are adjustable screw threaded studs engaging one of the clamping members or extensions thereon, to serve, if desired, as a support for the sound box casing, and 24, 24 are nuts which may serve to lock the supports 23 when desired.

The operation of the shown constructions

of the device is as follows: The bifurcated stylus lever is inserted in the device as shown with the junction part engaging the previously set gage 19 and the bifurcations engaging the grooves 25 of the clamping members 6, 7. The sound box casing is then inserted as shown between the bifurcations until the free ends 26 thereof are in line with the central axis of the diaphragm and with the connecting means which are preferably already applied thereto ready to be secured to the bifurcations. It will be understood that one of the bifurcations passes through an aperture in the boss of the sound box casing if already provided therewith. The predetermined pressure is then applied to the bifurcations by screwing down the nut or nuts 9, as much as the previously set gage or gages 10 will permit. The ends of the connecting means *x* are then secured to the ends 26 of the bifurcations, and the pressure of the clamping members is then released by unscrewing the nut or nuts 9. If the connecting means have not been previously made fast to the diaphragm, they are then so secured, and the connection therebetween is made air tight.

The device enables inexpert and inexpensive labor to be employed, while insuring accuracy and quickness in the production of the sound boxes and the same standard of efficiency in all thereof, even when assembling on a large commercial scale.

I claim:

1. A device for temporarily subjecting the bifurcations of forked stylus levers of gramophone, phonograph and the like sound boxes to predetermined stress while perma-

nent connecting means are being applied, comprising fork distorting members, a gage for controlling the distorting action, and means for holding the stylus lever against longitudinal displacement.

2. A device for temporarily subjecting the bifurcations of forked stylus levers of gramophone, phonograph and the like sound boxes to predetermined stress while permanent connecting means are being applied, comprising opposite clamping members, a gage for controlling the clamping action, and a second gage for holding the stylus lever against longitudinal displacement.

3. A device for temporarily subjecting the bifurcations of forked stylus levers of gramophone, phonograph and the like sound boxes to predetermined stress while permanent connecting means are being applied, comprising opposite clamping members, a gage for controlling the clamping action, a second gage for holding the stylus lever against longitudinal displacement, and means for supporting the sound box in position.

4. A device for temporarily subjecting the bifurcations of forked stylus levers of gramophone, phonograph and the like sound boxes to predetermined stress, comprising fork distorting members, a gage for controlling the distorting action, and a second gage for holding the stylus lever against longitudinal displacement.

JOSEPH HOFFAY.

Witnesses:

J. C. LARSEN,
PHILIP D. ROLLHAUS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

TALKING MACHINE,
#1,202,973-----P. B. Delany,
Patented-October 31st, 1916.
Filed-May 14th, 1915.

1,202,973.

P. B. DELANY.
TALKING MACHINE.
APPLICATION FILED MAY 14, 1915.

Patented Oct. 31, 1916.
3 SHEETS—SHEET 1.

Fig. 1.

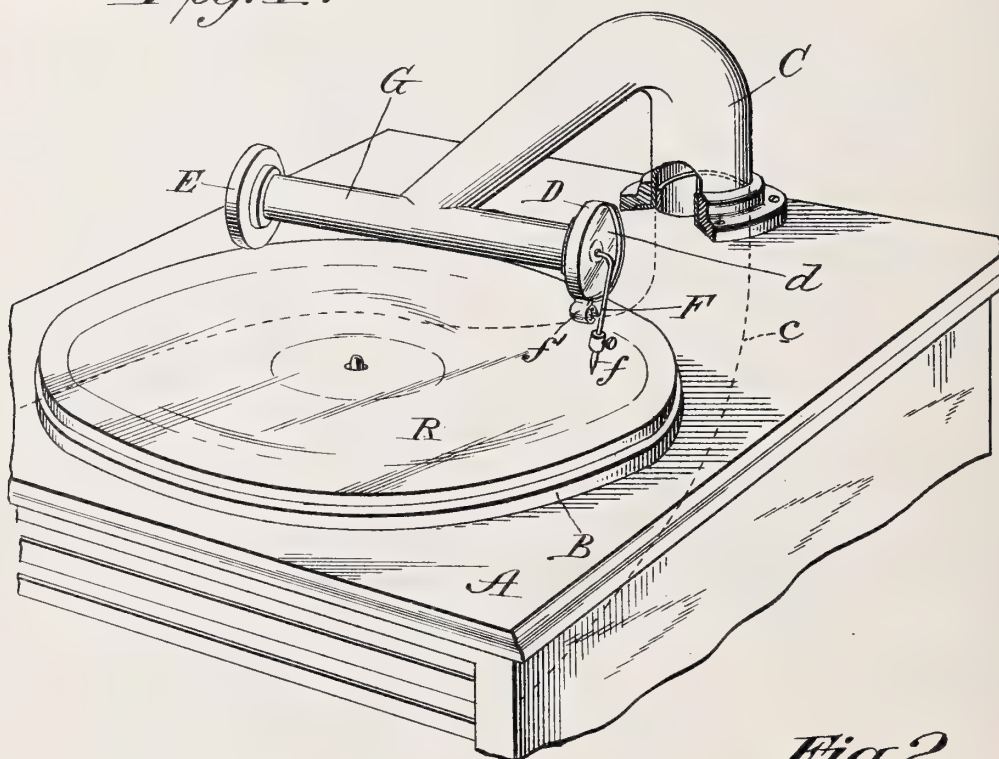
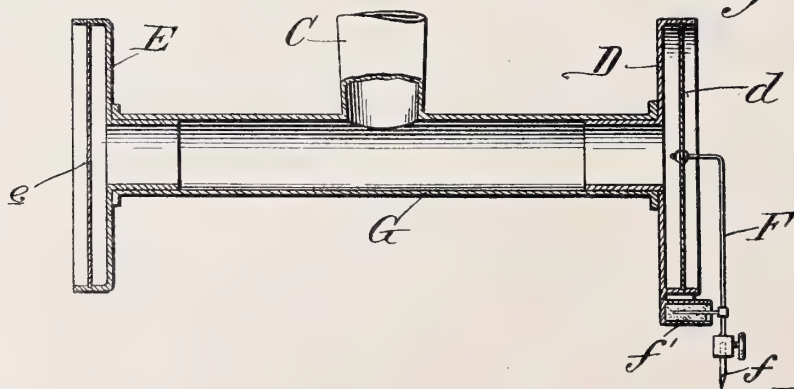


Fig. 2.



Inventor:
Patrick B. Delany.

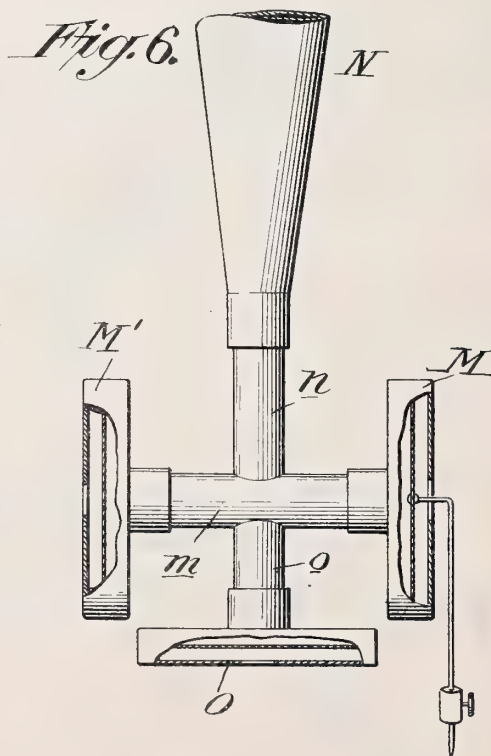
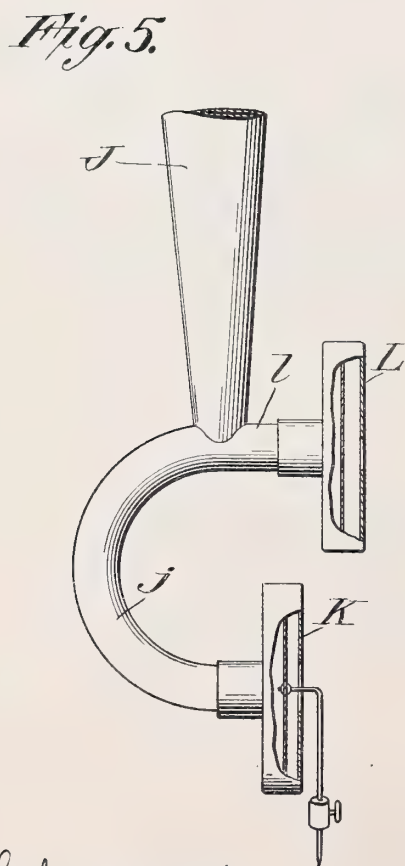
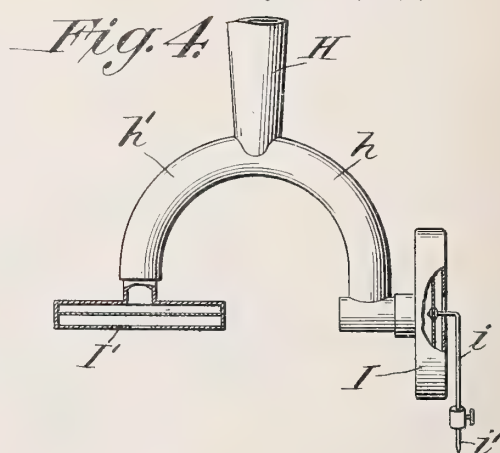
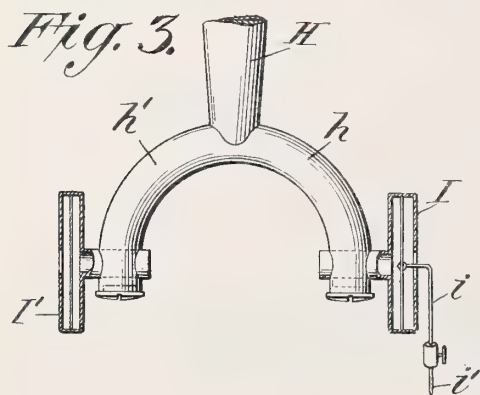
L. J. Browning
M. E. Rurell

By Edward C. Roridau
Attorney:

P. B. DELANY.
TALKING MACHINE.
APPLICATION FILED MAY 14, 1915.

Patented Oct. 31, 1916.
3 SHEETS—SHEET 2.

1,202,973.



*L. F. Downing
M. C. Burrell*

*Inventor:
Patrick B. Delany.*

*By Edward C. Carson
Attorney:*

1,202,973.

P. B. DELANY.
TALKING MACHINE.
APPLICATION FILED MAY 14, 1915.

Patented Oct. 31, 1916.
3 SHEETS—SHEET 3.

Fig. 7.

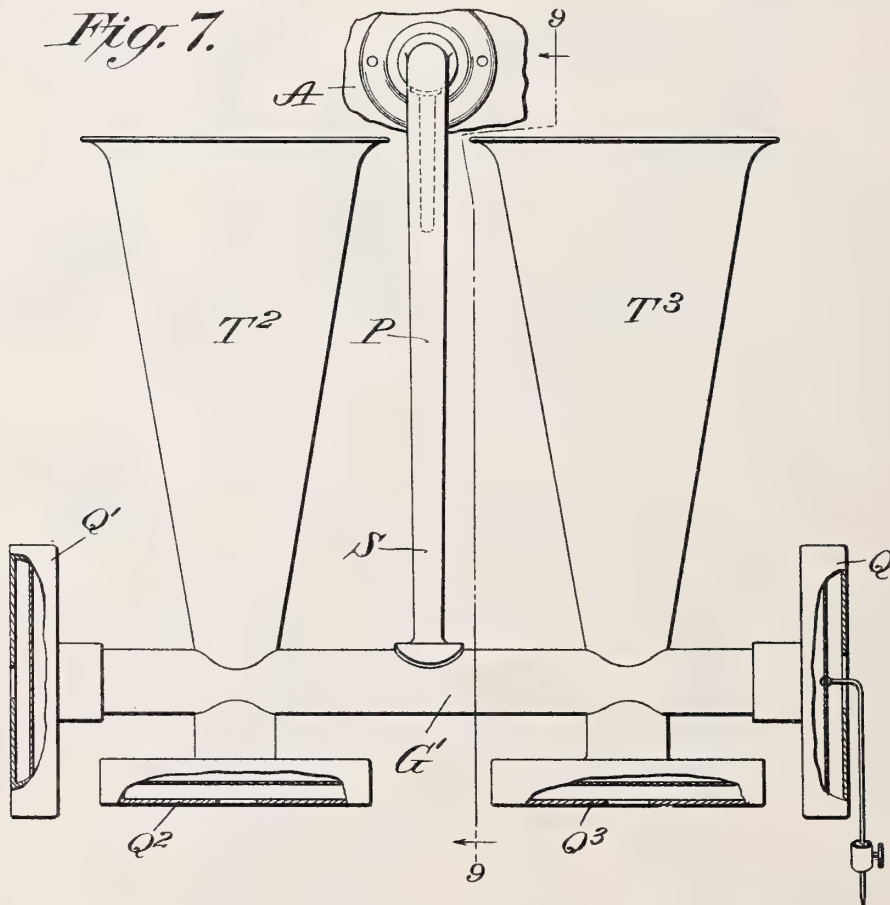
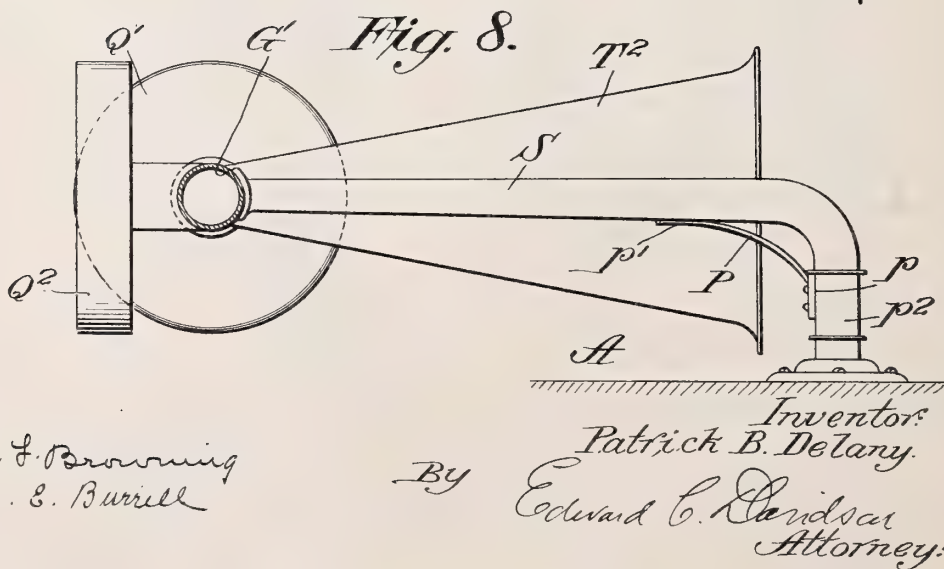


Fig. 8.



*L. F. Browning
M. S. Burdell*

*Inventor:
Patrick B. Delany.
By Edward C. Davidson
Attorney:*

UNITED STATES PATENT OFFICE.

PATRICK B. DELANY, OF SOUTH ORANGE, NEW JERSEY.

TALKING-MACHINE.

1,202,973.

Specification of Letters Patent.

Patented Oct. 31, 1916.

Application filed May 14, 1915. Serial No. 28,009.

To all whom it may concern:

Be it known that I, PATRICK B. DELANY, a citizen of the United States, residing at South Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

The object of this invention is to improve the tone and enunciation of talking machines and to eliminate as much as possible the metallic notes or sounds more or less incident to all such machines.

I have found that if a secondary diaphragm be properly combined with the usual diaphragm or if the usual sound-box be properly combined with an auxiliary diaphragm equipped box and both be made to transmit their vibrations to a common horn, amplifier or tone-arm or to horns receiving sound waves from all the diaphragms the desired results above mentioned may be obtained.

In carrying out my invention, I may employ two boxes, one, which I call the primary box, being equipped with a vibratory arm carrying a reproducing needle as usual, and the other or secondary box, being of similar construction but without a vibratory arm and needle. These boxes are preferably though not necessarily mounted at opposite ends of a tube or air chamber communicating with the mouth of an amplifier, horn or tone-arm. The arrangement being such that the vibrations produced in the primary box are transmitted to the secondary box, cause the diaphragm thereof to vibrate and to thus produce secondary sound waves which join the sound waves produced in the primary box and pass with them through the tone-arm or other conductor or amplifier to the listener. In this way a clearer, sweeter and more attractive reproduction is obtained.

In the accompanying drawings: Figure 1 is a perspective view of so much of a talking machine as is necessary to show one way of embodying my improvements. Fig. 2 shows a section through a part of a tone-arm and air chamber and the primary and secondary boxes applied thereto according to my invention. Figs. 3 to 6, inclusive, show various modified ways of embodying the invention. Fig. 7 shows how a primary box and a plurality of secondary sound-boxes may be combined with a plu-

ality of horns, tone-arms or amplifiers; and Fig. 8 indicates how the extra weight imposed on the tone-arm by the boxes may be compensated.

The cabinet A supports a turntable B for the record R. The tone-arm, amplifier or horn C may be made in any usual way but it carries at its mouth or front end an air chamber G which communicates with the part C in the manner indicated in Fig. 2. This chamber G, in the form of instrument shown, is disposed at right angles to the part C and extends to an equal extent on each side thereof. At one end it carries a sound-box D which may be of any preferred construction, its diaphragm *d* being connected with a vibratory arm or stylus bar F, supported at *f'* and carrying a needle *f*. At the opposite end of the chamber G is located the secondary box E which may be similar in all respects to the primary box D but has no vibrating arm, needle or needle-supporting arm. The sound waves produced by the diaphragm of the primary box impinge on the diaphragm *e* of the secondary box and also enter the mouth of the tone-arm or part C. The sound waves produced by the diaphragm of the secondary box are directed toward the primary box, join the primary waves and pass with them into the tone-arm. They are, in a sense, a reflection or echo of the corresponding waves proceeding from the primary reproducer but inasmuch as the boxes are quite close together no perceptible difference in the time of the entrance of such waves from both boxes into the tone-arm, amplifier or horn occurs and they reach the listener in perfect unison. In this way the usual metallic sounds are largely eliminated or smothered.

Experience has demonstrated that the primary and secondary waves assist in producing sweeter, clearer and more harmonious and agreeable tones than have heretofore been obtained where a single box has been employed.

There are various ways in which the secondary or additional diaphragm equipped boxes may be applied. Some of these are shown in Figs. 3 to 7, inclusive.

In Fig. 3 the mouth of the tone-arm H is shown as being provided with curved branches *h*, *h'*, one of which *h* is equipped with a sound-box I provided with a vibratory arm *i* and a reproducing needle *i'*, while

the other, h' , is provided with a secondary box I' of the kind shown in Fig. 1.

In Fig. 4 an arrangement similar to that shown in Fig. 3 is indicated, except that
5 whereas in Fig. 3 the boxes are shown as being parallel with each other those shown in Fig. 4 are disposed at right angles.

In Fig. 5 the tone-arm J is shown as being provided with a curved extension j
10 equipped with a reproducing sound-box and needle K and the tone-arm is also provided with a short branch l carrying a secondary box L .

Fig. 6 shows an arrangement of a larger
15 number of boxes, three being indicated. In this case the sound-box M is equipped with a vibratory arm and needle and connects with an air chamber m similar to that G shown in Fig. 1, and this air chamber connects with a secondary box M' and also with
20 the tone-arm or horn N through a conduit n . O indicates a third box connected with the chamber m by means of a branch pipe o . All of the boxes are actuated practically in
25 unison, the first by the reproducing needle and the others by the air waves generated by the diaphragm of the reproducer or primary box, and inasmuch as the boxes or diaphragms are quite close together there is no
30 interference of the waves of sound emanating from all the reproducers but they join each other and pass together in unison or coincident in pitch to the listener.

In Fig. 7 I have shown how a plurality of
35 horns amplifiers or tone-arms may be combined with a plurality of boxes. This may be done in various ways, but in the specific instance shown the primary box Q is mounted at the end of an air-chamber G' , at the
40 opposite end of which there is a secondary box Q' parallel with the box Q and there are two other secondary boxes Q^2 , Q^3 disposed at right angles to the boxes Q , Q' and also communicating with the air-chamber
45 G' . The horns T^2 , T^3 both communicate with the air-chamber and are supported, together with the air-chamber and the boxes by an arm S pivotally supported as shown, so that the reproducing mechanism may swing in
50 the usual way.

Fig. 8 is a section on the line 9—9 of Fig. 7 and it shows how the extra weight incident to the use of a plurality of boxes may be compensated. For this purpose a spring
55 P is secured at p to the joint of the support S and bears upon it at p' . The spring turns with the part p^2 of the joint. A similar device for a similar purpose may be applied to the construction shown in Figs. 1 to 6.
60 The construction shown in Fig. 7 provides ample and direct outlets for the sound waves from the various boxes and gives great volume and smoothness to the general effect of the combined renditions.

65 It will be understood that my invention is

not confined to any specific number of reproducers, tone-arms, or other sound emitters, or to any specific arrangement for bringing them into susceptible relation to the primary sound-box which controls them.

I claim:

1. A talking machine equipped with a tone arm, a primary and a secondary diaphragm of approximately the same rate of vibration, a chamber connecting the diaphragms with each other and with the tone arm and the sound waves from which join and pass together to the listener through said chamber and tone arm, said primary diaphragm being provided with devices for actuating it from the record and said secondary diaphragm being actuated solely by sound waves emanating from the primary diaphragm.

2. A talking machine equipped with a tone arm, a sound box where sound waves are primarily produced and a box having a diaphragm of approximately the same rate of vibration as the diaphragm of the sound box first mentioned and which receives the sound waves produced by said first mentioned sound box and generates secondary waves which join the primary waves and pass together to the listener through the tone arm and a chamber connecting said sound boxes with each other and with the tone arm.

3. A talking machine provided with a tone arm carrying primary and secondary boxes equipped with diaphragms and a connecting chamber and in which the secondary box receives through the connecting chamber the sound waves from the primary box and generates only secondary sound waves which pass with the primary waves through the tone arm to the listener.

4. A talking machine equipped with a tone arm, a primary box equipped with a diaphragm and a secondary box provided with a diaphragm having approximately the same rate of vibration as the diaphragm of the primary box, one of said diaphragms being actuated from the record and the other solely by sound waves emanating from the primary box and a chamber connecting said sound boxes with each other and with the tone arm.

5. A talking machine equipped with a tone arm provided with an air chamber communicating with a primary sound box actuated from the record and with a secondary box equipped with a diaphragm actuated solely by sound waves emanating from the primary sound box.

6. In a talking machine and in combination with the tone arm thereof a plurality of boxes equipped with diaphragms and communicating with each other and with the tone arm, the diaphragms or vibrating portions of which are arranged at an angle to each

other, the diaphragm of one of said boxes being actuated from the record and the other diaphragm being actuated by sound waves emanating from the last mentioned box.

- 5 7. A talking machine equipped with a tone arm, a reproducer provided with a diaphragm actuated from the record, and a box having a diaphragm of approximately the same rate of vibration as that of the repro-
10 ducer, said reproducer and box being connected by a walled conduit through which the primary sound waves pass to said box and through which conduit both the pri-
15 mary and secondary waves pass to the tone arm and thence to the listener.

8. A talking machine provided with a tone arm carrying primary and secondary boxes equipped with diaphragms and having a walled conduit connecting said boxes which conveys the primary sound waves to 20 the secondary box and which also conveys the primary and secondary sound waves to the tone arm.

In testimony whereof, I have hereunto subscribed my name.

PATRICK B. DELANY.

Witnesses:

ANNIE M. DELANY,
ANNIE P. RITENOUR.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

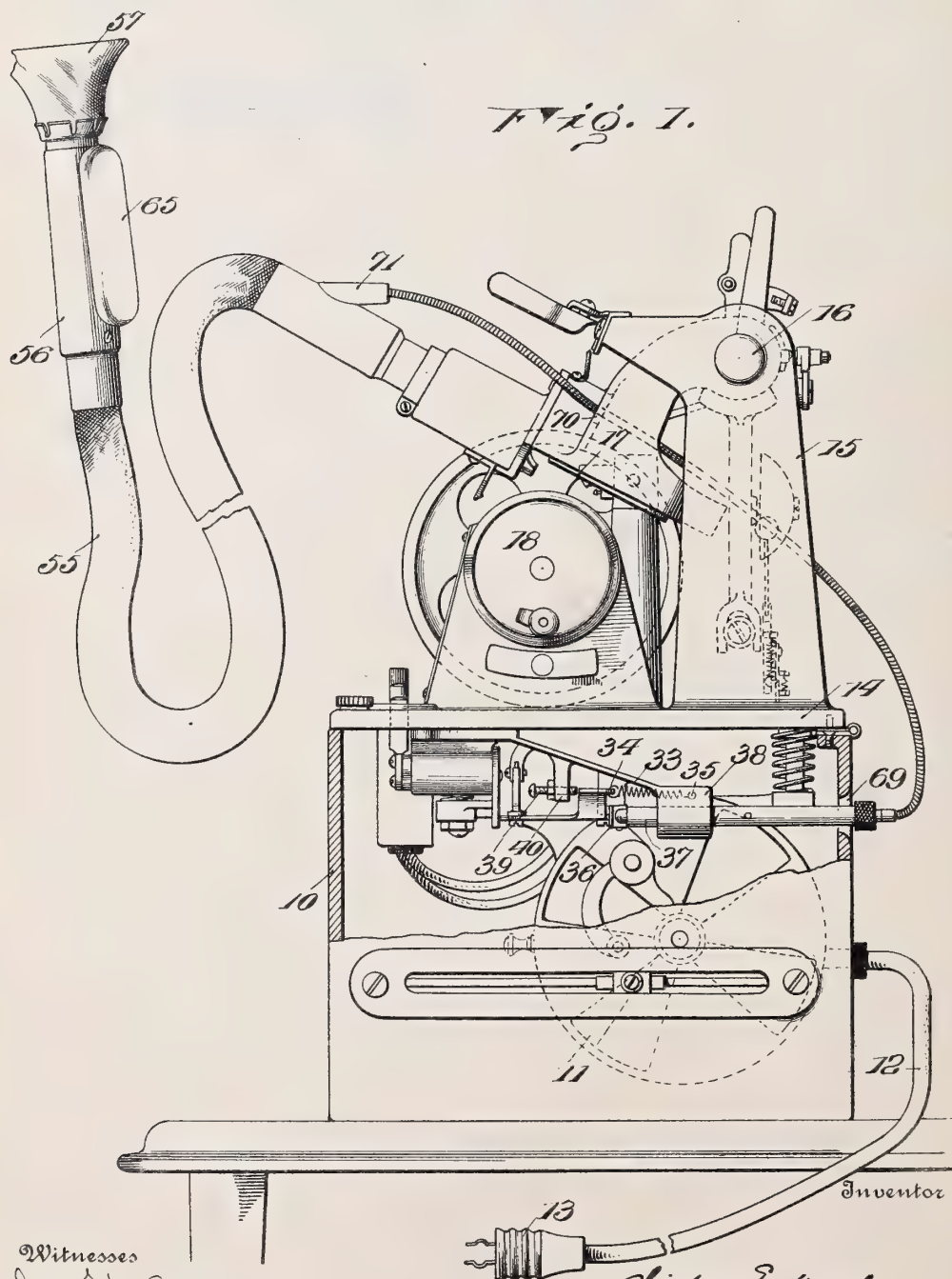
START AND STOP DEVICE FOR TALKING
MACHINES,

#1,203,088-----Clinton E. Woods,
Patented-October 31st, 1916.
Filed-September 8th, 1913.

C. E. WOODS.
 START AND STOP DEVICE FOR TALKING MACHINES.
 APPLICATION FILED SEPT. 8, 1913.

1,203,088.

Patented Oct. 31, 1916.
 3 SHEETS—SHEET 1.



Witnesses

James H. Anderson
E. E. Warfield

Clinton E. Woods.

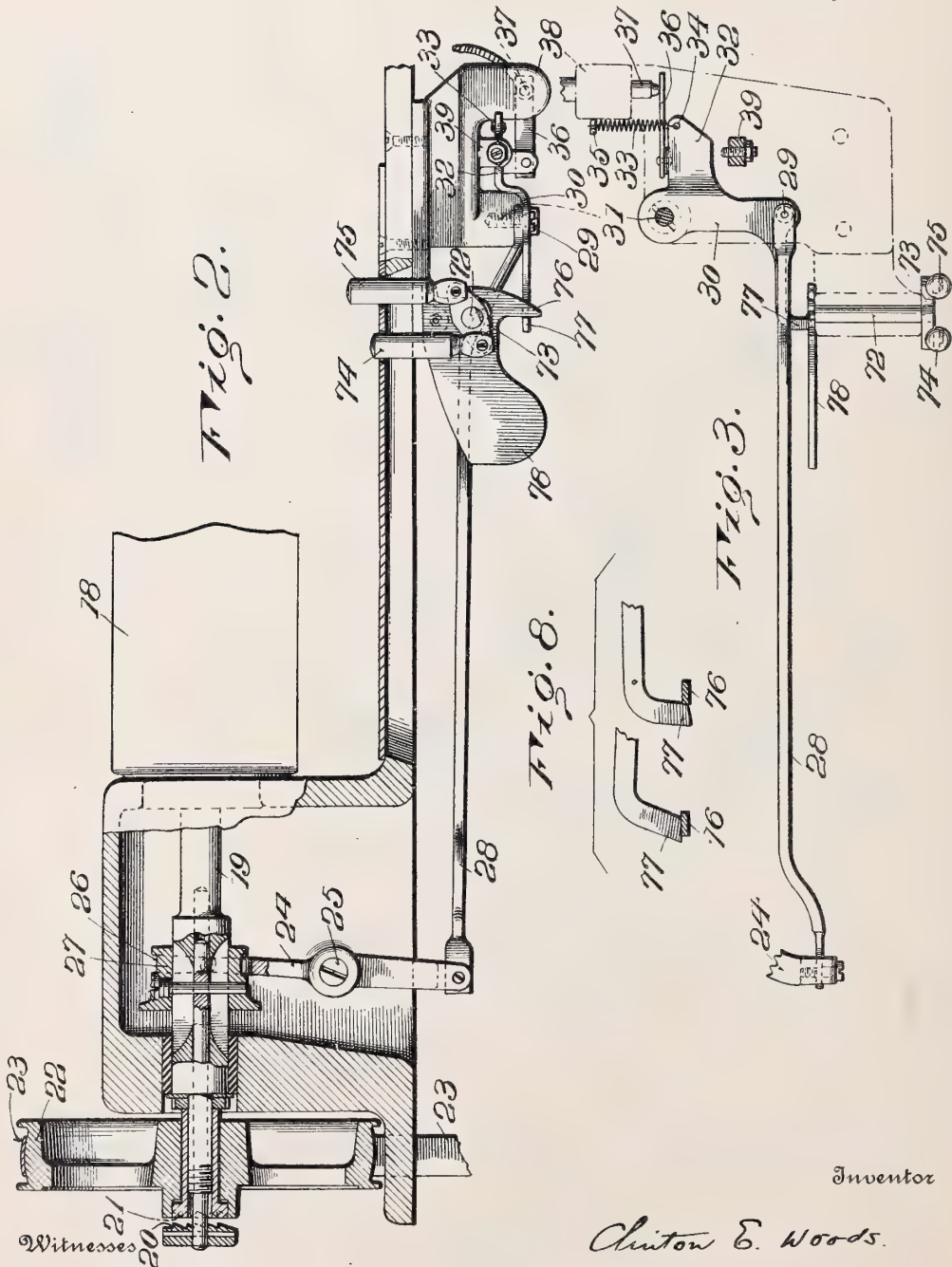
By
Mauro, Cameron, Lewis & Harris
 Attorneys

C. E. WOODS.
 START AND STOP DEVICE FOR TALKING MACHINES.
 APPLICATION FILED SEPT. 8, 1913.

1,203,088.

Patented Oct. 31, 1916.

3 SHEETS—SHEET 2.



Inventor

Clinton E. Woods.

Witnesses
 J. A. Anderson
 E. E. Warfield

By
 Mauro, Cameron, Lewis & Macie
 Attorneys



C. E. WOODS.
 START AND STOP DEVICE FOR TALKING MACHINES.
 APPLICATION FILED SEPT. 8, 1913.

1,203,088.

Patented Oct. 31, 1916.

3 SHEETS—SHEET 3.

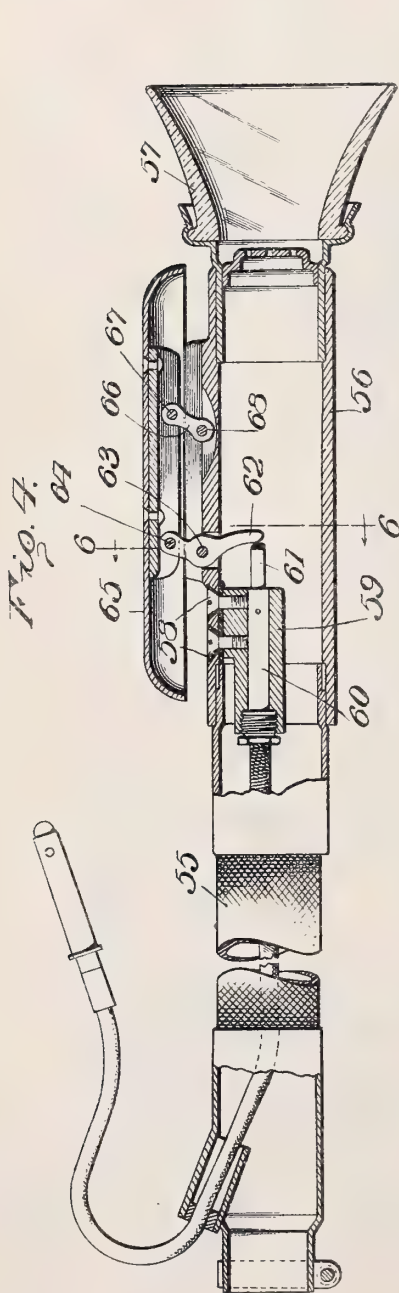


Fig. 5.

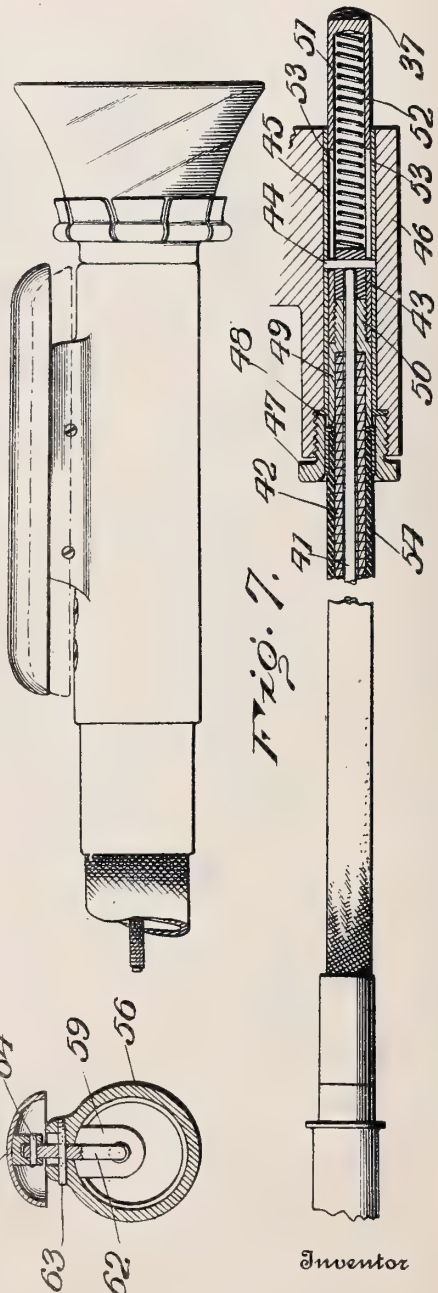


Fig. 6.

Inventor

Witnesses
 Jas. H. Anderson,
 E. E. Warfield

Clinton E. Woods,
 By
 Mauro, Cameron, Lewis & Cassie
 Attorneys

UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

START AND STOP DEVICE FOR TALKING-MACHINES.

1,203,088.

Specification of Letters Patent.

Patented Oct. 31, 1916.

Application filed September 8, 1913. Serial No. 788,695.

To all whom it may concern:

Be it known that I, CLINTON E. WOODS, of Bridgeport, Connecticut, have invented a new and useful Improvement in Start and Stop Devices for Talking-Machines, which invention is fully set forth in the following specification.

This invention relates to talking machines, and more particularly to the start-and-stop mechanism thereof, and has for its object to provide a simple, convenient and efficient means for starting and stopping the operation of the parts, whether it be the starting and stopping of a motor, or the starting and stopping of parts operated by a continuously moving motor.

Generally stated, the invention consists in any suitable start-and-stop mechanism, such as a switch that may be closed or opened for the purpose of admitting electric current to or excluding it from the motor, or a clutch mechanism which may be closed or opened for the purpose of connecting the moving parts of the machine to, or disconnecting them from, a continuously driven motor. Said start-and-stop mechanism in the present invention is combined in operative relation with one terminal of a flexible power transmitting means, a Bowden wire being the means most suitable. The other terminal of the power transmitting means is freely movable bodily in any direction relatively to the start-and-stop mechanism, and is adapted to be manually manipulated to control the said mechanism. By the term "manually," as hereinafter used, is meant, not only a hand-operated, but a foot-operated, mechanism, or any other means that is actuated by the operator to impart the desired movement to the power transmitting means.

The inventive idea involved is capable of receiving a variety of mechanical expressions, one of which, for the purpose of illustrating the invention, is shown in the accompanying drawings, but it is to be expressly understood that such drawings are illustrative only, and are not designed to define the limits of the invention, reference being had to the appended claims for this purpose.

In said drawings Figure 1 is a cross-sectional view, with parts in elevation, of a talking machine of the "Dictaphone" type,

embodying the invention; Fig. 2 is a longitudinal vertical section, partly in elevation, illustrating the operation of the device; Fig. 3 is a plan view corresponding to Fig. 2, some of the parts being omitted; Fig. 4 is a longitudinal section, partly in elevation, of the speaking tube, showing one means for operating the Bowden wire from the speaking tube; Fig. 5 is an elevation of the mouth-end of the speaking tube; Fig. 6 is a cross-section on the line 6—6 of Fig. 4; Fig. 7 is a longitudinal section, partly in elevation, showing the Bowden wire and the mounting for one of the terminals thereof; and Fig. 8 is a detail.

Referring to the drawings, wherein like reference numerals indicate like parts, 10 is the casing of the machine, in which is mounted, in any usual or suitable manner, an electric motor 11, to which current is delivered through the conductor 12, provided with a plug 13. The top plate of the casing is indicated at 14, and is provided with a pair of standards, one of which, 15, is shown in Fig. 1, said standards supporting the sleeve 16, in which is inclosed the usual feed-screw that propels the sound-box 17 longitudinally of the mandrel 18, on which the tablet is carried, said mandrel being supported on a shaft 19, on the end of which is one member 20 of any usual or suitable clutch mechanism, the other member 21 of which is secured to a continuously driven pulley 22, driven by a belt 23 from the motor 11. The clutch 20—21 is thrown into and out of operation by means of a lever 24 pivoted at 25, and having its forked end 26 engaging a clutch-shifting sleeve 27, and operating in a way that is well understood in the art. The clutch mechanism and clutch-shifting device shown are a preferred form, but any suitable clutch and shifting mechanism therefor may be employed. Connected to the lower arm of the lever 24 is a rod 28, which extends under the top plate or bed plate 14 of the machine, and is connected at its other end 29 to one arm 30 of a bell-crank lever fulcrumed at 31. The other arm 32 of said bell-crank lever has a spring 33 connected thereto at 34, the other end of the spring being connected at 35 to any permanent part of the machine. Secured to the arm 32 of the bell-crank lever is a spring blade 36, with which

contacts one terminal 37 of a flexible power transmitting means which is illustrated as being a Bowden wire. The terminal 37 is mounted in a casting 38 secured to the under-side of the bed plate 14. Rocking movement of the bell-crank lever 30—32 is limited by a stop screw 39, passing through a part 40 of the casting.

It is essential that the flexible power transmitting means shall consist of two permanent trains of mechanical elements one movable relatively to the other, and both freely movable bodily in any direction relatively to the fixed terminal 37. As will hereinafter more clearly appear, the free or impulse-receiving end of the power transmitting means is without any fixed or permanent support which can be relied upon to furnish an abutment to take the reaction resulting from the transmission of power. It is therefore necessary for the power transmitting means to have, as an essential part thereof, a permanent connection between the impulse-receiving and the impulse-imparting ends which is capable of taking the reactions. By providing a power transmitting means comprising two permanent relatively movable trains of mechanical elements, I am enabled to use one of the said trains for transmitting the power or the motion and the other for taking the reaction thereof. As stated, the power transmitting means is preferably a Bowden wire, which as is well known, consists of a core wire, having a closely wound coil or wire sheathing surrounding the same, the two parts being capable of longitudinal movement relative to each other. In the present invention, advantage is taken of this relative movement of the two parts of the Bowden wire to actuate the start-and-stop mechanism, by anchoring one member of the Bowden wire structure at the respective terminals thereof, and providing means for imparting movement to the other member at one terminal, which movement is transmitted to the other terminal placed in operative relation with the start and stop mechanism. Either member of the Bowden wire may be anchored, the other being left free to have movement imparted thereto. In the present instance, for the purpose of illustrating the invention, the inner member is anchored at its respective terminals, while the outer member is left free to move thereon.

The anchoring mechanism of the Bowden wire is substantially the same at each of the terminals, one of which is illustrated in detail in Fig. 7, in which 41 is the inner member or core of the Bowden wire, and 42 is the outer member or coiled sheath thereof. The inner member is secured in any suitable manner, as by soldering, to a block 43, which block is permanently fixed, by a pin 44 extending therethrough, to a tube 45, secured in an opening in the casting 46 by means of

a tubular screw or nut 47, engaging the flanged end 48 of the tube. The outer member 42 of the Bowden wire is secured, in any manner, as by soldering, within a cup-shaped plug 49, having a screw-threaded plug-end 50, which is screwed into the open end of a tubular terminal piece 51, a spring 52 being inclosed by the tubular terminal 51 between its closed end and the block 43. Said tubular terminal is provided with two slots 53 on opposite sides thereof, which play over the pin 44. As illustrated in Fig. 7, the terminal is shown projected to the right to the farthest limit of its outward movement. The Bowden wire may be, and usually is, provided with some suitable protective covering 54, of rubber or any other desirable material.

One of the terminals, as for example, the terminal 37 (Fig. 1) is mounted in operative relation with the start and stop mechanism of the talking machine. For example, as shown in Figs. 2 and 3, if the terminal 37 is projected outward, it will force the spring plate 36 (Fig. 3) downward, thereby rocking the bell-crank lever 30—32 on its fulcrum 31, shifting the rod 28 from right to left, and throwing the clutch members 20 and 21 into engagement, thereby starting the mandrel 18, and when pressure on the terminal 37 is removed, the spring 33 operates to shift the rod 28, through the bell-crank lever 30—32, from left to right, thereby opening the clutch members 20 and 21, and stopping the mandrel.

In Figs. 4, 5 and 6, is illustrated one manually operated means for actuating the other terminal of the Bowden wire, but it will be understood that the invention, as concerns some of its features, is not limited to the specific manually operated means here illustrated. In the construction shown 55 is the usual or any suitable speaking tube, connected to the talking machine as shown in Fig. 1, and 56 is a metallic tubular member secured to the end of the tube 55, and having the usual or any suitable mouth-piece 57 thereon. Mounted within the metallic tube 56, by means of two screws 58, 58, is a casting 59, having a tubular opening therethrough, and corresponding to the casting 46, shown in Fig. 7, for receiving the other terminal 60 of the Bowden wire, the projecting end 61 of the terminal being in operative relation with a lever 62 fulcrumed at 63 to the metallic tube 56. Said lever 62 is provided with an upwardly projecting arm pivoted at 64 to a hand-grip or a button 65. Said hand-grip is also connected to the tubular member 56 by a link 66, pivoted at one end 67 to the hand-grip, and the other end 68 to the tubular member, the parts being so constructed and proportioned that when the speaking tube and the hand-grip are grasped by the hand of the opera-

tor, the said hand-grip is moved downwardly against the tubular member 56, thereby shifting the levers 62 from right to left in Fig. 4, and giving an initial thrust to the terminal 61. It being remembered that said terminal is connected to the outer or sheath member 42 of the Bowden wire, this thrust is transmitted, through the outer member of the Bowden wire, to the terminal 37 in operative relation with the start-and-stop mechanism, thereby transmitting movement through the bell-crank lever 30—32 to the rod 28 (from right to left), closing the clutch 20—21 and starting the mandrel. When the grip of the operator is released, the spring 52 in the terminal 61, and the spring 33 connected to the bell-crank lever 30—32, act to shift the rod 28 from left to right, opening the clutch and stopping the mandrel. Preferably, the Bowden wire enters the casing 10 of the machine at the rear thereof, through an opening 69 (Fig. 1), and then passes upward, where, if desired, it may be supported on the recorder-reproducer, as at 70, and then preferably enters the speaking tube at a point 71, and extends within the speaking tube to the terminal support 59, hereinbefore described.

Means are provided whereby the start-and-stop mechanism may be operated by hand, independent of the Bowden wire construction, if desired, such means being illustrated in Figs. 1, 2 and 3, in which 72 is a rock shaft, mounted in any permanent part of the machine, and having rigidly fixed thereto a rocking beam 73, to the opposite ends of which are pivoted a stop-push-plug 74 and a start-push-plug 75, projecting upward through suitable openings in the bed plate of the machine, as shown in Fig. 2. Keyed to the rock shaft 72 is a downwardly depending lever arm 76, and the arm 30 of the bell-crank lever 30—32 has a forwardly projecting hooked member 77 (Figs. 2 and 3), which hooked end is slightly beveled at its extremity and is provided with a shoulder lying in the path of the downwardly depending lever arm 76 when the rock shaft is rocked by pushing the starting plug 75, thereby rocking the lever arm 76 from right to left. The engagement of the lever arm 76 with the shoulder on the hooked member 77 is, however, very slight, as will be seen by reference to the detail view shown in Fig. 8. As the start-plug 75 is pushed downward, lever arm 76 first engages the shoulder on the hooked arm 77, and as the bell-crank-lever 30—32 rocks on its fulcrum 31, said shoulder is turned slightly out of the path of movement of the lever arm 76, the side of which lever arm then contacts with very decided friction against the beveled end of the hooked arm 77, thereby serving to hold the parts in the position with the starting plug 75 depressed, the metal of the parts

yielding slightly to permit this action. On the rock shaft 72, and as here shown, integral with the lever arm 76, is a counterweight 78, and when the stop-plug 74 is depressed, the weight operates to insure the full rocking action of the rock shaft 72, to the position of the parts as shown in Fig. 2. To start and stop the machine by the use of the means last described, the starting plug 75 is depressed, thereby closing the clutch 20—21, and the machine is started. This action elevates the stop-plug 74, and when it is desired to stop the machine, such plug is depressed, thereby opening the clutch 20—21, and stopping the machine.

While, for the purpose of describing the invention, the specific start-and-stop mechanism and other specific means of anchoring the Bowden wire and the specific features, such as the means for imparting relative movement to the members of the Bowden wire have been described with considerable particularity, it is not to be understood that the invention is limited to the specific means thus shown and described, since it will be apparent to those skilled in the art that such means may, if desired, be varied within wide limits, without departing from the inventive idea involved, the limits of the invention being defined in the appended claims.

What is claimed is:—

1. The combination with a talking machine comprising a start-and-stop mechanism, of a manually operable control device bodily movable at will in any direction relatively to the start-and-stop mechanism, and a flexible mechanical connecting means interposed between the control device and the start-and-stop mechanism comprising two permanent trains of mechanical elements one movable relatively to the other, the said means serving to maintain a permanent positive operating connection between the said device and the said mechanism while permitting the former to be freely moved as aforesaid.

2. The combination with a talking machine comprising a start-and-stop mechanism, of a manually operable control means for the start-and-stop mechanism comprising a Bowden wire having one end connected with the said mechanism and having the other end bodily movable at will in any direction relatively to the start-and-stop mechanism.

3. The combination with a talking machine comprising a start-and-stop mechanism, of a manually operable control device for the start-and-stop mechanism bodily movable at will in any direction with respect to the start-and-stop mechanism and comprising a button movable relatively to the other parts thereof, and a Bowden wire having one end connected with the start-and-stop mechanism and the other end con-

nected with the control device with its axis at an angle to the line of movement of the button, the Bowden wire serving to maintain a permanent positive operating connection between the said mechanism and the said device while permitting the latter to be freely moved as aforesaid.

4. The combination with a talking machine comprising a start-and-stop mechanism, of a manually operable control means for the start-and-stop mechanism comprising a Bowden wire having one end connected with the said mechanism and having the other end bodily movable at will in any direction relatively to the start-and-stop mechanism, and means at the first said end of the wire for holding the inner element thereof against longitudinal movement, the said means permitting the outer element to be relatively moved longitudinally.

5. In a talking machine, the combination with start-and-stop mechanism, a lever mechanism freely movable bodily in any direction relatively to the start-and-stop mechanism, and a Bowden wire having one terminal in operative relation with said lever mechanism and bodily movable therewith, the other terminal of the Bowden wire being in operative relation with the start-and-stop mechanism of the talking machine.

6. The combination with a talking machine comprising a start-and-stop mechanism, of a flexible speaking tube having its outer end bodily movable at will in any direction relatively to the start-and-stop mechanism, a manually operable control device mounted on the outer end of the speaking tube and bodily movable therewith, and a flexible mechanical connecting means interposed between the control device and the start-and-stop mechanism comprising two permanent trains of mechanical elements one movable relatively to the other, the said means serving to maintain a permanent positive operating connection between the said device and the said mechanism while permitting the former to be freely moved as aforesaid.

7. In a talking machine, the combination with start-and-stop mechanism, a flexible speaking tube having its outer end bodily movable at will in any direction relatively to the start-and-stop mechanism, a lever mechanism mounted on the outer end of the speaking tube and bodily movable therewith, and a Bowden wire having one terminal in operative relation with said lever mechanism and freely movable bodily therewith, the other terminal of the Bowden wire being in operative relation with the start-and-stop mechanism of the talking machine, said Bowden wire extending within the speaking tube.

8. In a talking machine, the combination with start-and-stop mechanism, a lever

mechanism, manually actuated means for operating said lever mechanism, the said lever mechanism and the said manually actuated operating means therefor being freely movable bodily in any direction relatively to the start-and-stop mechanism, and a Bowden wire having one terminal in operative relation with said lever mechanism and freely movable bodily therewith, the other terminal of the Bowden wire being in operative relation with the start-and-stop mechanism of the talking machine.

9. The combination with a talking machine comprising a start-and-stop mechanism, of a flexible speaking tube having its outer end bodily movable at will in any direction relatively to the start-and-stop mechanism, a manually operable control button mounted on the end of the speaking tube and movable bodily therewith and relatively thereto toward or from its axis, and a Bowden wire having one end connected with the start-and-stop mechanism and having the other end extending along the flexible tube and connected with the control button, the Bowden wire serving to maintain a permanent positive operating connection between the said mechanism and the said button while permitting the latter to be freely moved as aforesaid.

10. In a talking machine, the combination with start-and-stop mechanism, a flexible speaking tube having its outer end bodily movable at will in any direction relatively to the start-and-stop mechanism, a lever mechanism mounted on the outer end of the speaking tube and bodily movable therewith, means actuated by the hand of the operator for operating said lever mechanism, the said means being also mounted on the outer end of the speaking tube and bodily movable therewith, and a Bowden wire having one terminal in operative relation with said lever mechanism and bodily movable therewith, the other terminal of the Bowden wire being in operative relation with the start-and-stop mechanism of the talking machine, said Bowden wire extending within the speaking tube.

11. In a talking machine, a mandrel shaft, a clutch associated therewith, a pivoted lever, connections between said clutch and pivoted lever, a lever mechanism freely movable bodily in any direction relatively to the said pivoted lever, and a Bowden wire having one of its terminals in operative relation with said pivoted lever and its other terminal in operative relation with said lever mechanism and movable bodily therewith.

12. The combination with a talking machine comprising a start-and-stop mechanism, of two manually operable control devices one bodily movable at will in any direction relatively to the start-and-stop

mechanism and the other fixed against
bodily movement relatively thereto, and a
mechanical power transmitting system in-
terposed between the said control devices
5 and the start-and-stop mechanism and serv-
ing to maintain a permanent positive oper-
ating connection between the said devices
and the said mechanism, one part of the
said system being freely movable to permit

the first said control device to be freely 10
moved as aforesaid.

In testimony whereof I have signed this
specification in the presence of two sub-
scribing witnesses.

CLINTON E. WOODS.

Witnesses:

JOHN R. PETRIE,

JOHN S. GRIFFITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

STOP FOR TALKING MACHINES,
#1,203,119-----T.W.Kirkman,
Patented-October 31st, 1916.
Filed--June 13th, 1913.

T. W. KIRKMAN.
STOP FOR TALKING MACHINES.
APPLICATION FILED JUNE 13, 1913.

1,203,119.

Patented Oct. 31, 1916.
4 SHEETS—SHEET 1.

Fig. 1

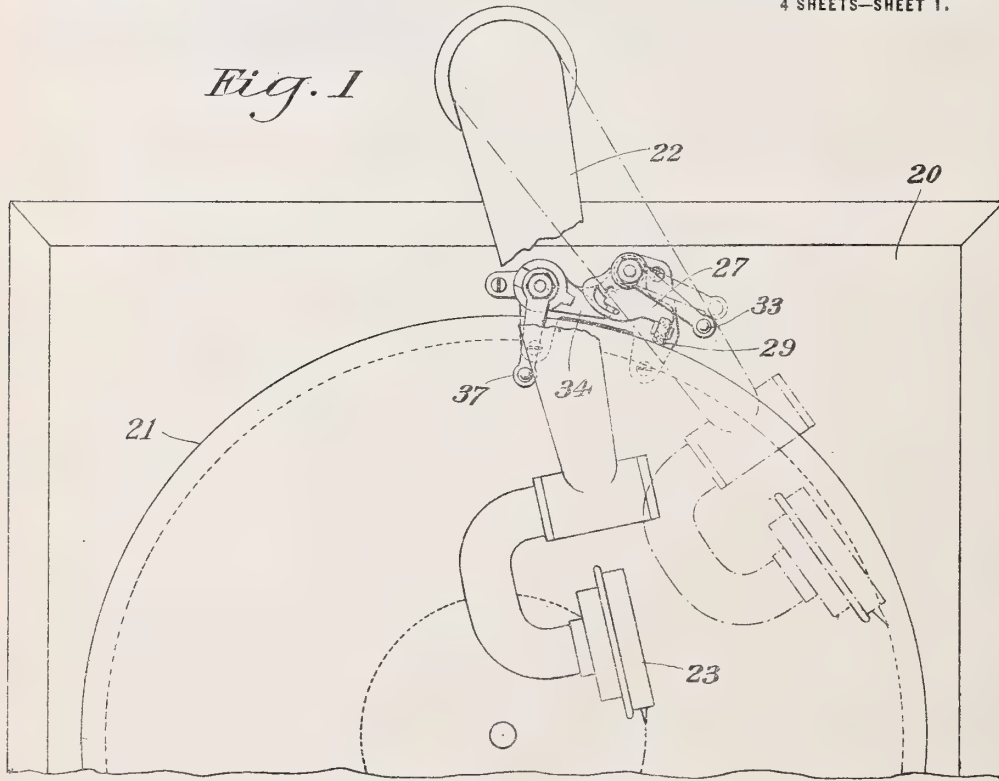


Fig. 2

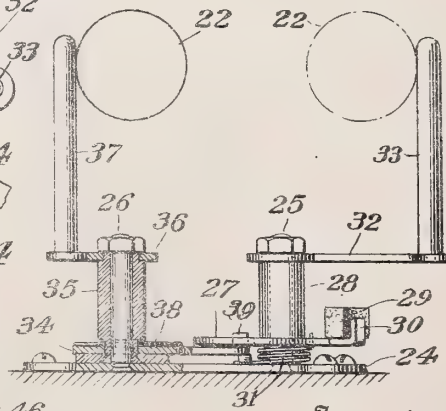


Fig. 3

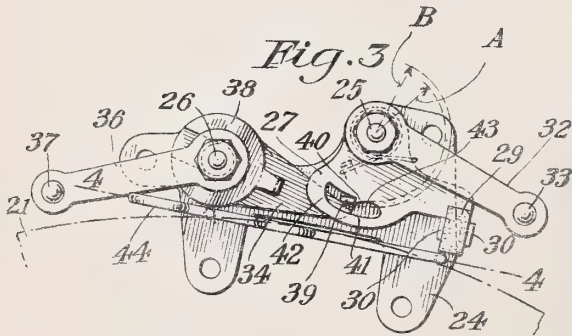
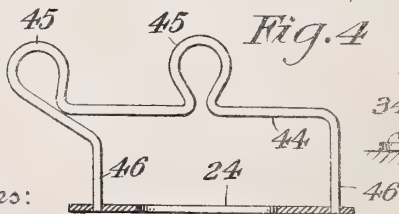


Fig. 4



Witnesses:

*Cora Williams
Raphael Heller*

Inventor
T. W. Kirkman
By his Attorney
Robert M. Pierson

T. W. KIRKMAN.
STOP FOR TALKING MACHINES.
APPLICATION FILED JUNE 13, 1913.

1,203,119.

Patented Oct. 31, 1916.
4 SHEETS—SHEET 2.

Fig. 5

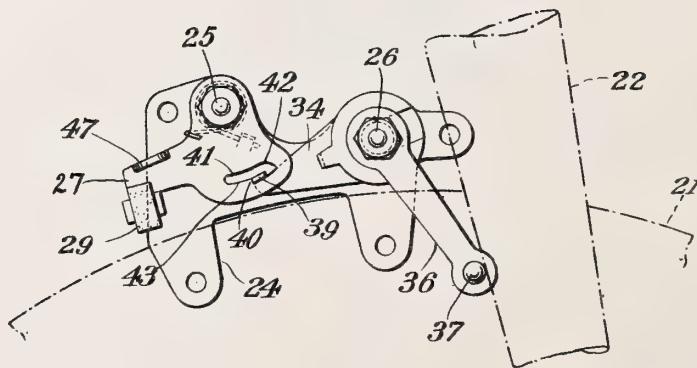
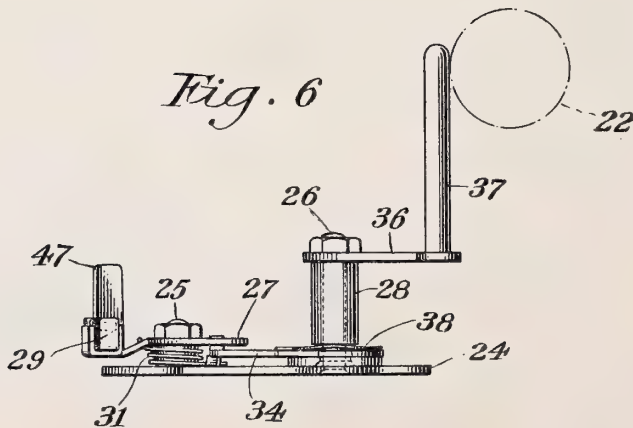


Fig. 6



Witnesses:

Corra Williams
Raphael better

Inventor
T. W. Kirkman
By his Attorney
Robert M. Pierson



T. W. KIRKMAN.
STOP FOR TALKING MACHINES.
APPLICATION FILED JUNE 13, 1913.

1,203,119.

Patented Oct. 31, 1916.

4 SHEETS—SHEET 3.

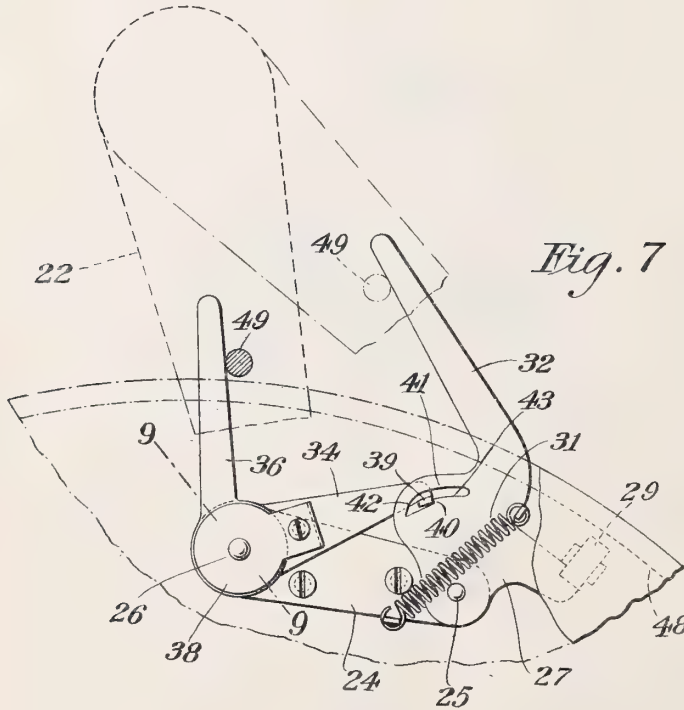


Fig. 7

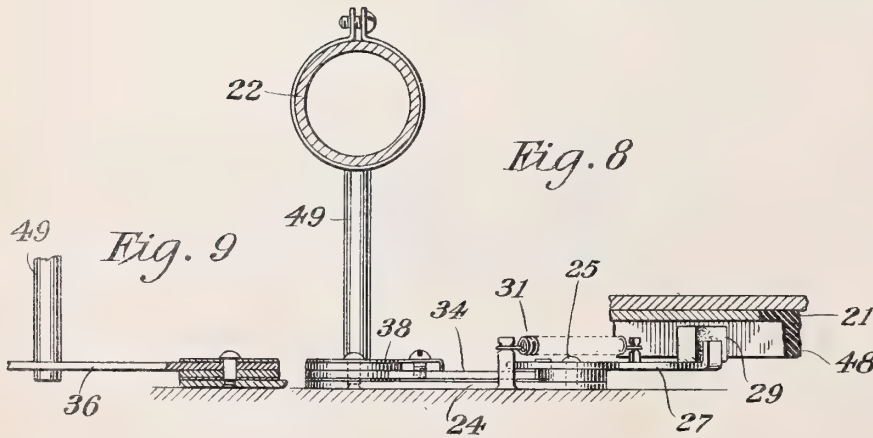


Fig. 8

Fig. 9

Witnesses:
Cora Williams
Raphael Ketter

Inventor
T. W. Kirkman
By his Attorney
Robert M. Pierson

T. W. KIRKMAN.
STOP FOR TALKING MACHINES.
APPLICATION FILED JUNE 13, 1913.

1,203,119.

Patented Oct. 31, 1916.
4 SHEETS—SHEET 4.

Fig. 10

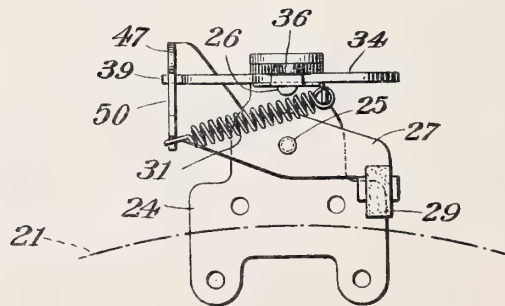


Fig. 12

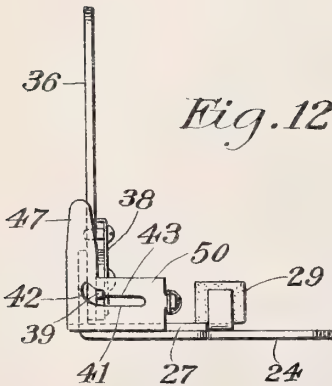
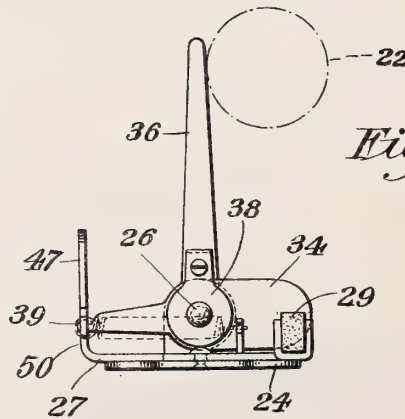


Fig. 11



Witnesses:
Cora Williams
Raphael Better

Inventor
T. W. Kirkman
By his Attorney
Robert M. Pierson

UNITED STATES PATENT OFFICE.

THOMAS W. KIRKMAN, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO
KIRKMAN ENGINEERING CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF
NEW YORK.

STOP FOR TALKING-MACHINES.

1,203,119.

Specification of Letters Patent.

Patented Oct. 31, 1916.

Application filed June 13, 1913. Serial No. 773,403.

To all whom it may concern:

Be it known that I, THOMAS W. KIRKMAN, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Stops for Talking-Machines, of which the following is a specification.

This invention relates to automatic stops for talking-machines, especially machines of the disk-record type.

One of my objects is to enable the point on the record at which the tripping action occurs to be accurately determined and controlled.

A second object is to automatically and positively accomplish the setting of the latch member by the starting or releasing movement of the brake member.

A third object is to furnish improved means for releasing the brake by the action of the sound-arm; and a fourth object is to enable the stop, when supplied in the form of an attachment, to be accurately gaged in position with reference to the turn-table.

Of the accompanying drawings, Figure 1 represents a plan view of a portion of a disk talking-machine provided with my improved stop. Fig. 2 represents an elevation of the stop, with parts in section. Fig. 3 represents a plan view of the stop on a larger scale, with the gage in place. Fig. 4 represents a section on line 4—4 of Fig. 3, showing the gage. Figs. 5 and 6 represent, respectively, a plan and elevation showing a modification. Fig. 7 represents a plan view showing a second modification. Fig. 8 represents an elevation of the latter, partly in section. Fig. 9 represents a section on the line 9—9 of Fig. 7. Figs. 10, 11 and 12 represent, respectively, a plan, and front and side elevations showing a third modification.

Referring to Figs. 1 to 4, 20 indicates the cabinet, 21 the turn-table, 22 the sound-arm, and 23 the reproducer of a well-known type of gramophone.

24 is the flat base-plate of the stop, 25 and 26 are posts mounted thereon, and 27 is a brake-plate secured to a sleeve 28 which turns on the post 25.

29 is a leather brake block clamped between ears 30 which are struck up from the sheet-metal brake-plate, and 31 is a spring

surrounding the lower part of post 25 for urging the brake inwardly against the edge of the turn-table. The sleeve 28 has fixed to its upper end an arm 32 carrying a vertical pin 33 with which the sound-arm 22 may make contact in order to set the brake in the off position when the reproducer is carried outwardly before starting on a selection.

34 is a latch-plate pivoted on a sleeve 35 which turns on the post 26, and 36 is an arm fixed to the upper end of said sleeve and carrying a vertical pin 37 with which the sound-arm makes contact at the end of a selection in order to trip the latch-plate. The pivotal adjustment of said arm with respect to the latch-plate enables the operator to adjust the tripping point to correspond with the length of the record-groove, and a spring-plate or washer 38 interposed between the latch-plate and sleeve creates frictional resistance to their relative turning movement.

39 is a projection turned up on the end of the sheet-metal latch-plate 34 for engaging a shoulder 40 formed on the brake-plate 27, in order that said latch-plate may restrain the brake in its off position. Said shoulder is formed on one side of a slot 41, and on the opposite side, near one end of the slot, is formed a cam surface 42, which carries the projection 39 into the path of shoulder 40 when the brake-plate is turned into its off position somewhat beyond the position which it assumes when restrained by the latch-plate.

43 is an abutment or rest for the latch-ing projection 39, formed on the inner side of slot 41 adjacent to the shoulder 40, and acting as a stop for the latch-plate when the contact arm 36 is being adjusted with the brake in the stopping position. The position of this abutment with reference to the free end or corner of shoulder 40 has an important influence on the proper timing of the trip action, for I have discovered that, although theoretically the two should be on the same radius or line of motion, yet in practice, owing to lost motion of parts, rounding of the corner of said shoulder, or other causes, the tripping action tends to occur too soon when they are so related. I therefore slightly offset the abutment 43 from the corner of shoulder 40 as represented in Fig. 3 (the amount of offset being

exaggerated to make it clear), by locating it, in the present instance, on a shorter radius A than the radius B of said shoulder.

44 represents a temporary wire gage, bent with loops 45 to serve as handles, and legs 46 to enter holes in the base-plate 24, whereby the stop may be properly located with reference to the edge of the turn-table 21 when it is being applied to the talking-machine, the legs of said gage being adapted to abut against the turn-table, and one of them being located in the path of the brake 29 so that the latter must be retracted when applying the stop. After the holes 15 for the attaching-screws of the base-plate have been made in the cabinet, the gage is removed and the base-plate is screwed in place.

After being attached to the cabinet, the stop is adjusted and operated as follows: The reproducer-stylus is located in the last record groove, which is usually one of several blank grooves following the end of the selection. The brake plate 27 being in the stopping position as shown in Fig. 1, the contact arm 36 is then turned relatively to the latch-plate 34 until its pin 37 reaches the sound-arm 22, the projection 39 on said latch-plate meanwhile resting against the abutment 43. The angle between the contact arm and the latch-plate will then, owing to the offsetting of said abutment from the corner of shoulder 40, be greater than if said corner and abutment were on the same radius, or in other words, such offsetting is equivalent to delaying the point at which the tripping action occurs (by the escape of shoulder 40 past the projection 39) and its amount is made sufficient to compensate for the tendency to premature tripping due to the causes above mentioned. The brake-plate 27 is now retracted to release the turn-table, either directly by hand, or indirectly through contact of the sound-arm 22 with pin 33, causing said brake-plate to be turned on its pivot when the reproducer is moved out beyond its position for the beginning of the selection. Slot 41 is made long enough to allow this retraction to be continued beyond the engaging point of members 39, 40, so that the cam surface 42 may carry the projection 39 into the path of shoulder 40, whereupon the brake-plate is allowed to return until said members are engaged. The stylus is then placed in the record groove, and at or just after the end of the selection the latch-plate 34 will be tripped and the brake released through contact of the sound-arm with post 37.

The modification shown in Figs. 5 and 6 differs from the foregoing by a transposition of the brake-plate and latch-plate, and omission of the feature of brake release through the action of the sound-arm, a finger-lip 47 for direct manual actuation of

the brake-plate 27 being substituted on the latter in place of the contact arm. Similar parts in these and succeeding views of the drawing are designated by the same numerals as in Figs. 1 to 4.

Figs. 7 to 9 represent a modification in which the brake works outwardly against the inner side of a flange 48 depending from the edge of the turn-table, and the stop is mainly located underneath the latter, its projecting brake-release arm 32 and adjustable trip-arm 36 being engaged at the two extremes of movement of the sound-arm by a pin 49 clamped to and projecting downwardly from said sound-arm. A straight-pull spring 31 is shown in place of the circular-pull spring of the preceding views.

In Figs. 10 to 12 I have shown a third modification wherein the movements of the brake-plate and latch-plate are in planes at right-angles to each other, the latch-plate 34 being mounted to turn on a horizontal pivot-post 26 and having an upright adjustable trip-arm 36, while the brake-plate has an upturned portion 50 formed with the brake-release lip 47 and the members for coacting with the latch-plate.

Various other modifications could be made without departing from my invention.

I claim:—

1. A talking-machine stop comprising a brake, a latch for holding said brake in its off position, a trip member controlling said latch and adjustable with reference thereto to time the occurrence of the tripping action, and an abutment forming a stop for the latch during the setting of the trip-member while the brake is in its stopping position, said abutment being positioned to compensate for the tendency to premature tripping.

2. A talking-machine stop comprising a brake-plate having a shoulder, a latch-plate provided with an adjustable trip-member and also having a member for engaging said shoulder to hold the brake-plate in its off position, and an abutment on said brake-plate, offset from the line of motion of the shoulder, and forming a stop for the latch-plate during the adjustment of the trip-member while the brake-plate is in its stopping position.

3. A talking-machine stop comprising a pivoted, spring-projected brake-member having a latch-engaging shoulder and an offset latch-abutment adjacent thereto, a pivoted latch-member having a projection for engaging said shoulder when the brake is in the off position and for engaging said abutment when the brake is in the stopping position, and an adjustable trip-member frictionally connected with said latch-member.

4. A talking-machine stop comprising brake and latch plates pivoted to turn on

parallel axes, said latch-plate having a projection, and said brake-plate having a shoulder to engage said projection when the brake is off, and an abutment on a shorter radius than the shoulder to engage said projection when the brake is on, and a trip-arm pivotally and frictionally connected with said brake-plate.

5. A talking-machine comprising a braking element and a latching element having complementary engaging members whereby the braking element is restrained in its off position, a brake-setting spring attached to said braking element, means on the braking element for positively alining said engaging members by the retracting movement of the braking element, and a trip-member connected with the latching element and adapted, when engaged at the end of the selection, to move said latching element so as to release the braking element and permit the latter's spring to set the brake.

6. A talking-machine stop comprising a pivoted latch-plate having a projection and also having a trip-member, and a pivoted brake-plate having a shoulder adapted to engage said projection, and a cam surface adapted to engage the projection and aline it with the shoulder when the brake-plate is retracted beyond the engaging position.

7. A talking-machine stop comprising a brake, and means for restraining said brake in the off position, said means including a projection, and a member formed with a slot, on one side of which is a shoulder to engage the projection, and on the other side a cam to aline said shoulder and said pro-

jection, and a trip-member for disengaging the two.

8. The combination with a turn-table and a traveling element, of a stop comprising a pivoted brake-plate, an arm directly attached thereto and located in the path of outward movement of a part connected with said traveling element, a spring attached to said brake-plate for setting the latter in its stopping position, a latch for restraining said brake-plate in its off position, and a contact-arm connected with said latch for tripping said latch by the inward movement of the traveling element.

9. In combination with a turn-table, a stop attachment comprising a base-plate, braking, latching and tripping elements mounted thereon, and a gage abutting against the periphery of the turntable and detachably connected with said base-plate for initially positioning the latter and the braking element with respect to the turntable.

10. A stop attachment for talking-machines comprising a base-plate having a brake, a latch and a latch-tripping member, and a wire gage formed with legs adapted to be positioned in holes in the base-plate, one of said legs being located in front of the brake when the latter is retracted.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses, this 12th day of June, 1913.

THOMAS W. KIRKMAN.

Witnesses:

EDWARD E. BLACK,
G. BLAKE.

APPARATUS FOR MEASURING OR
RECORDING OSCILLATIONS, IMPULSES, and
THE LIKE,

#1,203,172-----A. Behm,
Patented-October 31st, 1916.
Filed-April 24th, 1915.

A. BEHM.

APPARATUS FOR MEASURING OR RECORDING OSCILLATIONS, IMPULSES, AND THE LIKE.

APPLICATION FILED APR. 24, 1915.

1,203,172.

Patented Oct. 31, 1916.

Fig. 2.

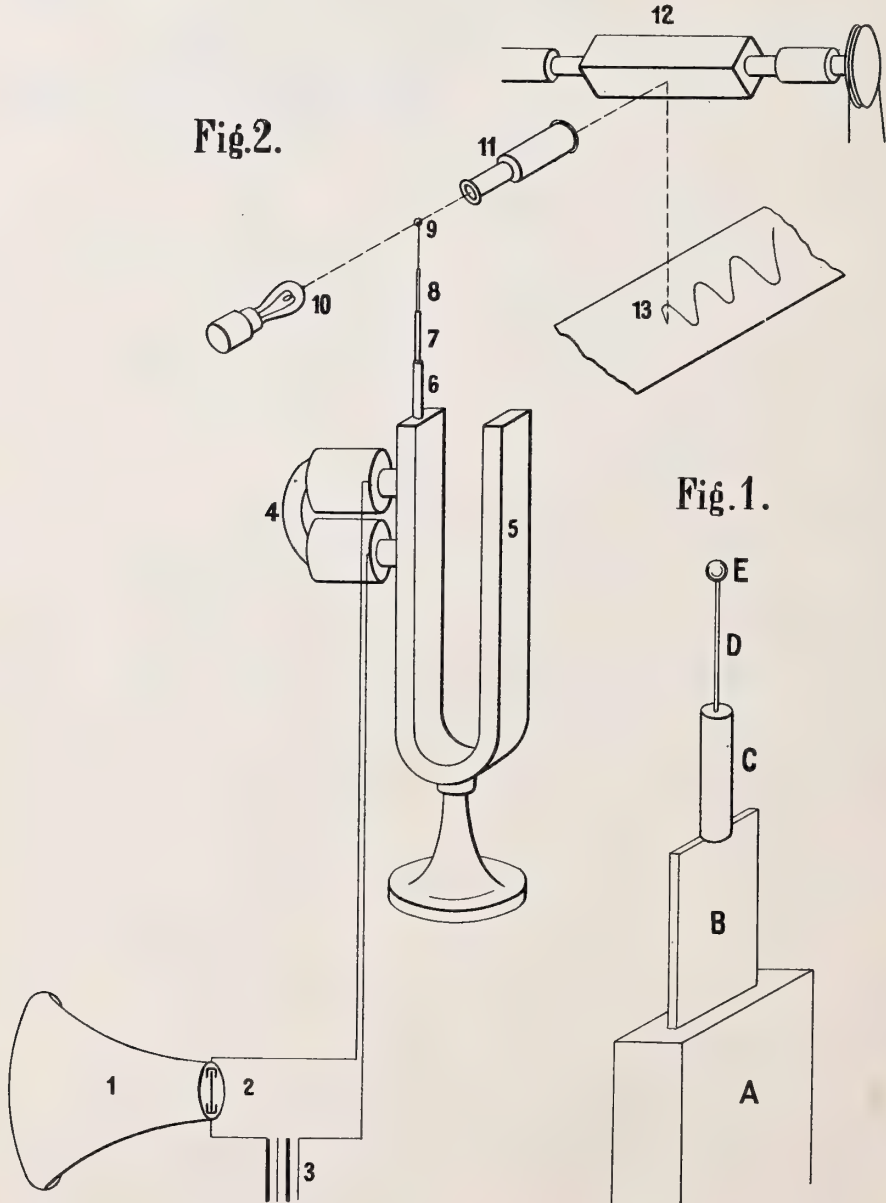
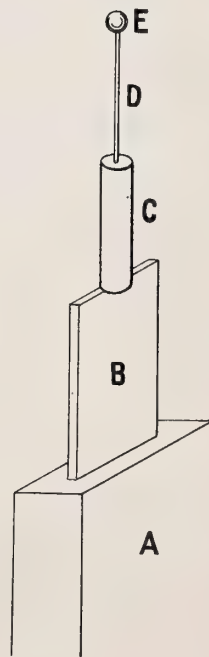


Fig. 1.



Witnesses:

Chas. E. Whiteman.
H. D. Penney

Inventor:

Alexander Behm,
By his atty, F. W. Richards

UNITED STATES PATENT OFFICE.

ALEXANDER BEHM, OF KIEL, GERMANY.

APPARATUS FOR MEASURING OR RECORDING OSCILLATIONS, IMPULSES, AND THE LIKE.

1,203,172.

Specification of Letters Patent.

Patented Oct. 31, 1916.

Application filed April 24, 1915. Serial No. 23,732.

To all whom it may concern:

Be it known that I, ALEXANDER BEHM, a subject of the Emperor of Germany, residing at Hardenbergstrasse 31, Kiel, Germany, have invented certain new and useful Improvements in Apparatus for Measuring or Recording Oscillations, Impulses, and the like, of which the following is a specification.

10 This invention relates to an apparatus for recording and measuring mechanical, acoustic, or electro-magnetic oscillations or impulses.

Hitherto an oscillating or vibrating body, 15 such as for instance a tuning fork or a rod, has been used for measuring oscillations and the like. According to this invention, a series of members preferably rod or bar shaped, are used, connected together in order of diminishing weight, the heaviest member being attached to the body whose vibrations are to be used. The lightest member, which will be the most remote from the vibrating body, may be utilized as 20 an indicator part.

In the apparatus according to the invention, the final oscillation or deflection becomes *ceteris paribus*, greater than could ever be attained with a single member. 30 Moreover a great damping can be obtained, as owing to greater visibility of the phenomenon, the tuning need be less sharp, the measuring member being coupled to the tuning fork or other vibrating device used with the apparatus by the intermediate member or members in a looser manner than hitherto. By suitably calculating the dimensions and the ratios of oscillation of the separate members of the combination, it is 40 possible for instance to insure that the measuring member would come to rest again within a period of $1/50$ sec. in spite of having made a large deflection. This strong damping is brought about not only by the increased air resistance due to the greater length of surface, but chiefly by the vibrations which the separate members perform relatively to each other. Further, as is well known, oscillating bodies start resonance 50 vibrations not only when they receive impulses corresponding to fundamental vibration, but they respond also to harmonics thereof. This phenomenon cannot be observed in the older arrangements, as tuning forks generally respond only to funda-

mental vibrations. In the apparatus according to the invention, on the contrary, it is possible to insure, by suitable tuning, that one or more of the different members will respond in a more energetic manner to 60 harmonics so that both the fundamental vibration and the harmonics can be clearly recognized in the curve produced.

The invention is described with reference to the accompanying drawings, in which— 65

Figure 1 shows diagrammatically a construction of the apparatus itself; and Fig. 2 illustrates a method of using the apparatus.

In Fig. 1, A is a steel bar, for instance a prong of a tuning fork, B is a steel spring, 70 C a glass filament of, say, 0.2 mm. diameter, D is a glass filament of, say, 0.05 mm. diameter, which carries at its end, at E, a small ball. When the single constituent parts A, B, C, D, E are properly tuned 75 relatively to each other, a vibration of the glass ball E, will be obtained which is considerably greater than the vibration of the bar A.

In the construction described, it has been 80 assumed that the members C and D are of cylindrical type. These members as well as the part E may, however, with advantage be in the form of flat blades, and the single member could then be placed on 85 each other flat or cross-wise. It is further possible to make the members of one piece of material suitably shaped so that the various members are differentiated from each other. Finally the members with the exception of the ball E, may consist entirely 90 of fine cylindrical or flattened glass tube.

For measuring vibrations, the indicator device could be mounted either on a tuning fork, with or without a resonator, or on a 95 diaphragm, with or without a resonator, or finally on a spring blade or on an oscillating rod. The tuning fork of the diaphragm or the spring blade could then be set in vibration either directly by an impinging sound 100 or impulse, or indirectly, by means of a microphone which takes up the sound or impulse, and sets the tuning fork, diaphragm or spring blade into vibrations by means of an electromagnet. 105

In Fig. 2, 1 is a sound horn which transmits the arriving sound or impulse wave to a microphone 2, which correspondingly controls the energizing of an electromagnet 4 by means of a source of current 3. In front 110

of the poles of the said magnet vibrates the tuning fork 5 carrying the many times tuned glass threads 6, 7, 8, and at the upper end the glass ball 9. The glass ball 9 gives
 5 a dot-like image of a source of light 10, which image is recorded in the form of a curve on a sheet 13 sensitive to light, by means of a microscope 11 and a rotating mirror 12.

10 In addition to sound and similar waves, mechanical or electro-magnetic waves can also be recorded. In the latter case, the instrument could be used in place of the torsion galvanometer or of the oscillograph,
 15 provided that it is properly tuned.

What I claim is:—

1. In vibrating measuring apparatus, a vibrating body, and a series of vibrating members of different degrees of vibration
 20 joined to each other in order of degree of vibration, the member having the least degree of vibration being attached to the vibrating body.

2. In vibration measuring apparatus, a
 25 vibrating body, and a series of vibrating members of different degrees of vibration joined to each other in order of degree of vibration, the member having the least degree of vibration being attached to the vibrating
 30 body, and the extreme member forming an indicator.

3. In a vibration measuring apparatus, a vibrating body, a series of bar-shaped members of different degrees joined to each other
 35 in order of degree of vibration, the member of least vibration being attached to the vibrating body, and a ball at the end of the member of greatest vibration.

4. In a vibration measuring apparatus, a

vibrating body having attached thereto a
 40 rod which is reduced in a series of steps toward the free end of the rod, each reduced part being of smaller mass than the next part nearer the vibrating body.

5. In a vibration measuring apparatus, a
 45 tuning fork, a steel blade projecting upward from an arm thereof, a glass filament of smaller mass than the steel blade projecting upward therefrom, a second glass filament of smaller mass than the first projecting
 50 upward from the said first filament, and a small ball on the free end of the second filament.

6. In vibration measuring apparatus, a vibrating body, a series of vibrating members
 55 of different degrees of vibration joined to each other in order of degree of vibration, the member of least vibration being attached to the vibrating body, and means for transmitting vibrations to the vibrating body.
 60

7. In vibration measuring apparatus, a vibrating body, a series of vibrating members of different degrees of vibration joined
 65 to each other in order of degree of vibration, the member of least vibration being attached to the vibrating body and the extreme member forming an indicator, means for transmitting vibrations to the vibrating body, and means for producing a visual record of
 70 the displacements of the indicator.

In witness whereof I have hereunto signed my name this 3rd day of April 1915, in the presence of two subscribing witnesses.

ALEXANDER BEHM.

Witnesses:

JULIUS RÖPKE,

PAUL POPPENDUCK.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

RECORDING AND REPRODUCTION OF PULSATIONS OR
VARIATIONS IN SOUNDS AND OTHER PHENOMENA,
#1,203,190-----C.E.Fritts, Dec'd., by
J.H.Fritts, Administratrix.
Patented-October 31st, 1916.
Filed-October 22nd, 1880.

C. E. FRITTS, DEC'D.

J. H. FRITTS, ADMINISTRATRIX.

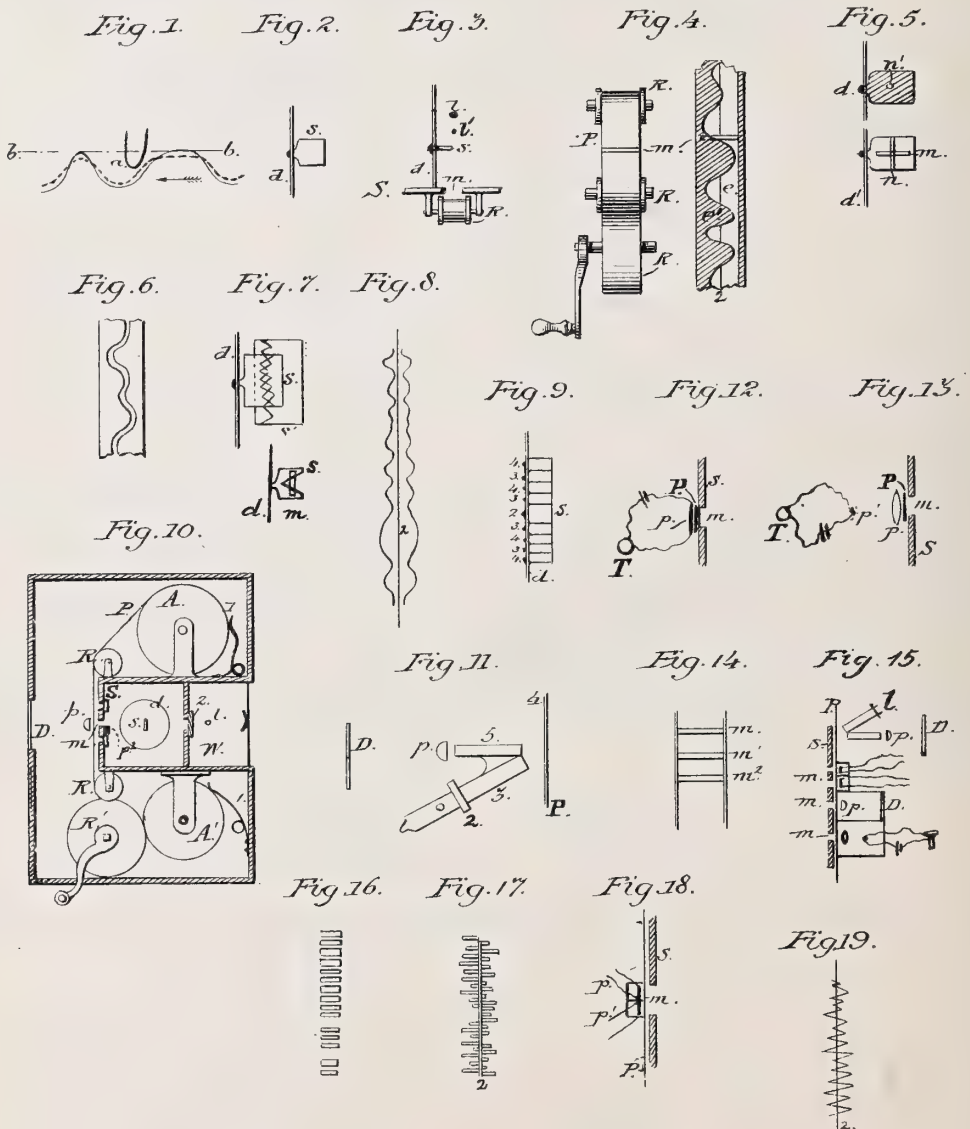
RECORDING AND REPRODUCTION OF PULSATIONS OR VARIATIONS IN SOUNDS AND OTHER PHENOMENA.

APPLICATION FILED OCT. 22, 1880.

1,203,190.

Patented Oct. 31, 1916.

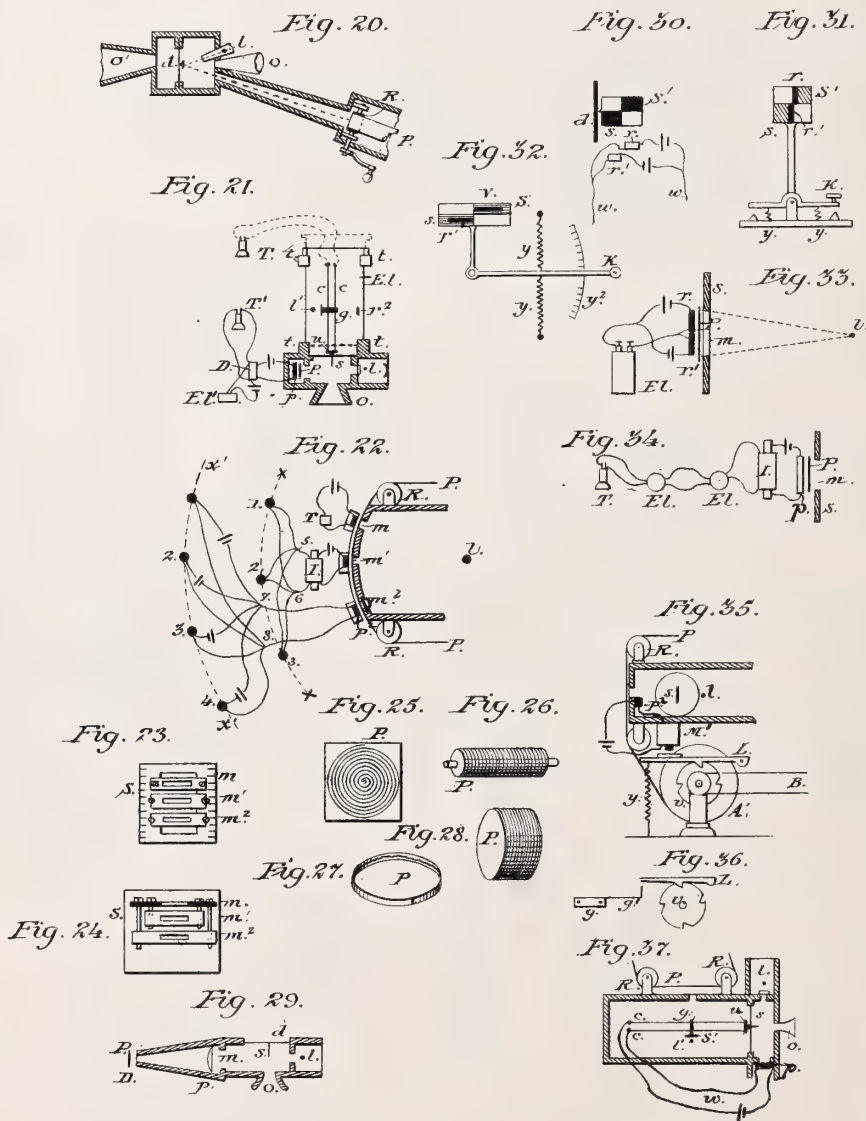
4 SHEETS—SHEET 1.



Witnesses:
Chas. L. Wilbur
F. Yerrell

Inventor:
Charles E. Fritts

C. E. FRITTS, DEC'D.
J. H. FRITTS, ADMINISTRATRIX.
RECORDING AND REPRODUCTION OF PULSATIONS OR VARIATIONS IN SOUNDS AND OTHER PHENOMENA.
APPLICATION FILED OCT. 22, 1880.
1,203,190. Patented Oct. 31, 1916.
4 SHEETS—SHEET 2.



Witnesses:
L. Fritts
J. H. Fritts.

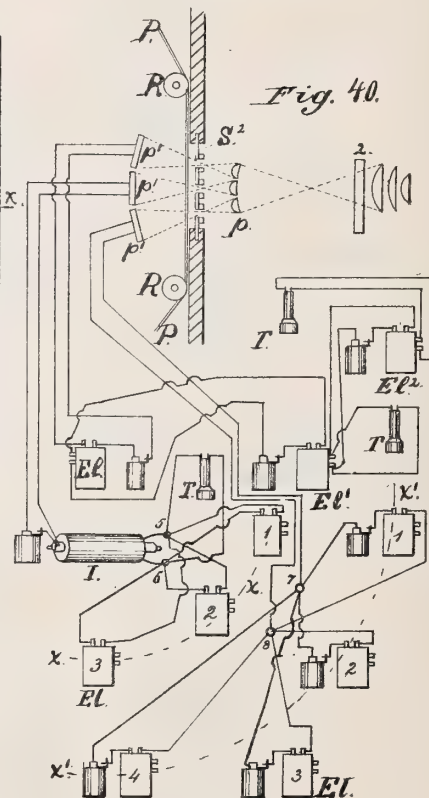
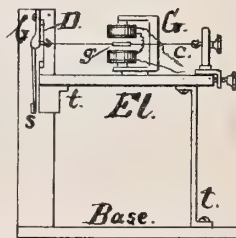
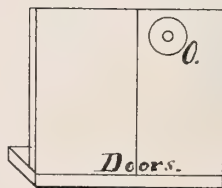
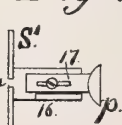
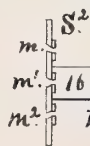
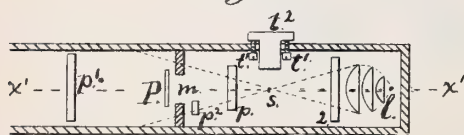
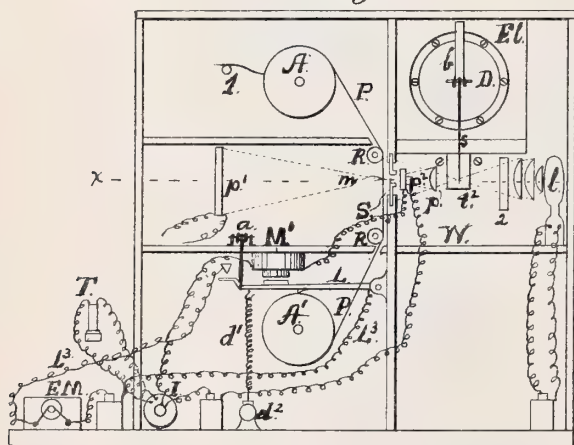
Inventor:
Charles E. Fritts

J. H. FRITTS, ADMINISTRATRIX.

APPLICATION FILED OCT. 22, 1880.

Patented Oct. 31, 1916.

4 SHEETS—SHEET 3.



W. H. Fuller
George Jackson

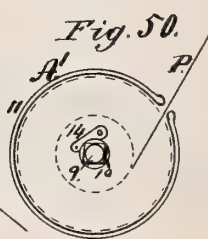
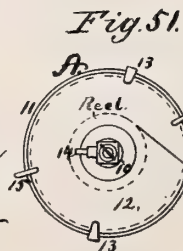
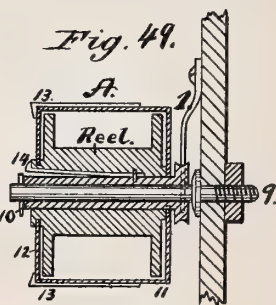
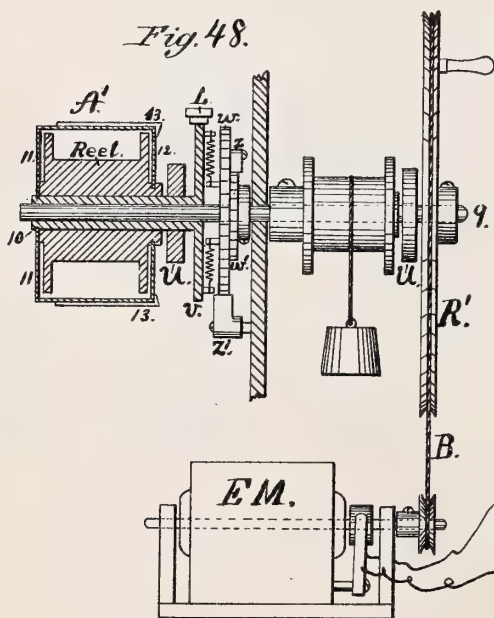
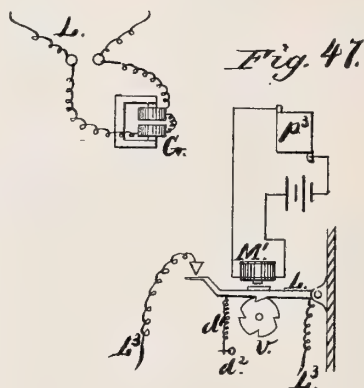
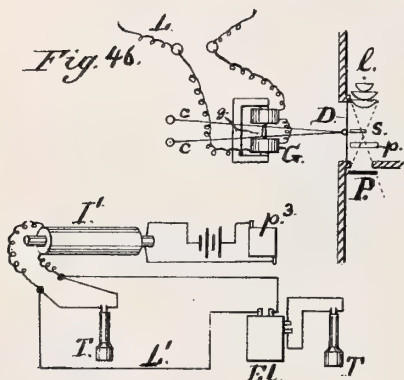
Chas. E. Fritts

C. E. FRITTS, DEC'D.
J. H. FRITTS, ADMINISTRATRIX.
RECORDING AND REPRODUCTION OF PULSATIONS OR VARIATIONS IN SOUNDS AND OTHER PHENOMENA.
APPLICATION FILED OCT. 22, 1880.

1,203,190.

Patented Oct. 31, 1916.

4 SHEETS—SHEET 4.



Witnesses;
W. H. Fuller
George Jackson

Inventor;
Chas. E. Fritts

UNITED STATES PATENT OFFICE.

CHARLES EDGAR FRITTS, OF NEW YORK, N. Y.; JOSEPHINE H. FRITTS, ADMINISTRATRIX OF SAID CHARLES EDGAR FRITTS, DECEASED, ASSIGNOR, BY MESNE ASSIGNMENTS, TO JOHN D. MYERS, OF PHILADELPHIA, PENNSYLVANIA.

RECORDING AND REPRODUCTION OF PULSATIONS OR VARIATIONS IN SOUNDS AND OTHER PHENOMENA.

1,203,190.

Specification of Letters Patent.

Patented Oct. 31, 1916.

Application filed October 22, 1880. Serial No. 19,313.

To all whom it may concern:

Be it known that I, CHARLES EDGAR FRITTS, a citizen of the United States, residing at New York city, in the county of
5 and State of New York, have invented new and useful Improvements in the Recording and Reproduction of Pulsations or Variations in Sounds and other Phenomena, of which the following is a specification.

10 This invention relates to recording variations or pulsations in sounds, light, or electrical currents, in a permanent or tangible form, and reproducing the same at will, not merely at the instrument alone, but also at
15 any other instrument suitably connected therewith—and not merely in their original forms, but also changed as may be desired.

Several methods of recording are herein explained in order to justify broad claim
20 and any suitable method may be used in connection with the other parts of my system.

The invention as described consists mainly in the application of photography and electricity for recording and reproducing such
25 variations and pulsations by the aid of a diaphragm or equivalent device capable of vibrating under those influences and particularly under the influence of sounds, as hereinafter fully set forth. I have, therefore,
30 termed it a photo-phonographic apparatus.

Apparatus for recording and reproducing sounds, commonly called phonographs, are not new, but they have been very imperfect—
35 the practical difficulties preventing either a perfect record of the sounds or a perfect reproduction of them having been hitherto insurmountable. I have, therefore, sought to dispense as far as possible with
40 mechanical methods and means in dealing with such subtle and intangible phenomena and have devised a new method of procedure and new apparatus for carrying out the same, which I claim in this application,
45 by which I am enabled to exert and control any desirable amount of force for performing the different operations required by properly manipulating imponderable forces by means of devices which have of themselves a minimum force of movement, and which require exceedingly little force to move them. I thus obtain results which
50 so far as I am aware have never before been

obtained, as regards ease, certainty, rapidity, or accuracy, either in recording or reproducing sounds and similar phenomena.

Broadly speaking, my invention is based upon the laws governing the behavior of certain substances when exposed to the action of radiant energy. The action of actinic
60 rays of light upon certain substances producing effects known as photographic need not be explained, as that method of utilizing radiant energy is well known and my invention does not relate to photographic processes,
65 but any suitable or well known processes may be employed in the recording operations of my invention. Another mode of action of radiant energy is in changing electrical resistance, as shown by the action
70 of light upon certain substances, notably selenium, whose electrical conductivity is well known to be greatly increased by exposure to light. Amorphous phosphorus is similarly affected and other substances are known
75 which may be employed in like manner. I utilize this action of radiant energy for suitably controlling and varying electrical currents in different ways, but preferably by arranging the sensitive substance in a
80 current-controlling device of an elongated form in the path of the rays from the source of light, and varying the quantity of light which falls upon it by varying the length of the illuminated portion of it. Having made
85 this conducting substance a part of an electric circuit, and adapted the device to control the intensity and direction of the currents flowing through it, I vary its action upon the currents by means of a
90 suitable device arranged across the path of the beam of light and movable lengthwise of the current-controlling device, whereby it will expose a greater or less length of the current-controller to light, in accordance with its own movements, and, consequently, with the phenomenon or influence which causes its motion. The resistance of a current-controlling device for the purposes of this invention may, however, be conveniently varied in many other ways of which I have herein named several.

A third mode of action of radiant energy which I utilize is the action of light upon certain substances, causing them to vibrate,
105 and I have described and illustrated this

part of my invention as being carried out by throwing the light, after being properly manipulated by my devices, upon thin plates adapted to vibrate under the action of varying light and made from suitable materials, especially of hard rubber. This action of radiant energy is believed to be due to the thermal rays of the light, as it is found to be best produced by heat rays acting upon substances which are highly athermanous or absorbent of heat. Any such substance may, of course, be utilized for this part of my process and I have named several which may be substituted for the hard-rubber plates or diaphragms. When the intensity of the light (or thermal rays) is caused to vary in accordance with the pulsations or sound waves constituting a certain sound, and this varying light is thrown upon a suitable substance, that substance is caused to vibrate in accordance with those changes in the actuating force and consequently gives out sound corresponding to those changes or pulsations. As a matter of course, the stronger the actuating influence is, the greater is the effect produced. I also increase the effect by amplifying the recorded variations of the original phenomena when recording them on the negative, as herein fully set forth, and then employ this "negative" for manipulating the light or actuating force before throwing it upon the diaphragm or other sensitive body. Such a negative will, of course, produce more marked and effective variations in the light, and more powerful vibrations in a sensitive substance exposed to its action.

In describing my process, I shall for convenience call the effective force "light", although I am aware that that term is not strictly correct. It is well understood that what is generally known as light is made up of rays or forces having different properties, as, actinic, or chemical, luminous, thermal, and possibly others. Even in the case of the photographic image and the metal selenium used in my process, it is not strictly correct to say that the effects are produced by "light" rays for it is known that they may be produced by rays which are not luminous, although they ordinarily accompany the luminous rays in light. I mean, therefore, by the word "light" both in this specification and in the claims those rays, forces, or forms of energy which produce the effects, whatever their name or nature may be and whether they are luminous or not. In like manner I include not only the particular substances named as sensitive to such influences, but any others which are known to be their equivalents or have the property of being similarly affected and which may, therefore, be utilized for the purposes of my invention in substantially the same manner as herein set forth.

I will now describe a method of carrying out my process which will show the nature of my invention. I first utilize the phenomena which I wish to record in themselves varying a beam of light, and then throw this varying light upon a sensitive surface moved uniformly along in the path of the beam, thereby producing an impression or image thereon, which I afterward treat in any well known or suitable way to render permanent and adapt it to reproduce the original phenomena. For instance, I cause a sound which I wish to record to impinge upon a vibrating diaphragm and so vibrate a shutter in accordance with its own pulsations or sound waves. This shutter is arranged to vibrate across a beam of light and interrupt or manipulate it, producing variations in the light in accordance with the original sound waves or pulsations. This varying light I then throw upon a suitably prepared sensitive surface, and record those variations upon it, as by photography. In order to secure a continuous record of these variations I confine the action of the light to a very limited portion of the sensitive surface, as by means of a slitted screen or partition, which stops all light except that which passes through the slit. This slit or opening is of any suitable length preferred, but the width of it is very slight. Thus, at any given instant, the light can reach only a long and very narrow section or area of the sensitive surface. Now, by moving the latter along uniformly past the slit in the direction of its width, successive portions are exposed to the light coming through the slit and record the successive changes in the light, thus producing a negative or record thereof in the form of a long, narrow strip. This negative I render permanent and adapt it to reproduce similar pulsations or variations as by making the parts acted on by light transparent and the rest opaque. Other ways are described or may be used for treating the negative which I now term the "pattern". Any phenomenon may be thus recorded which is capable of vibrating the shutter or varying the light or other force which acts upon the sensitive surface to produce the record as described. These phenomena may act directly on the vibrating devices or sensitive surfaces, or indirectly, or may be transmitted from any distance in the form of varying electric currents which are then utilized for vibrating the shutter or varying the beam of light.

The sensitive surface may be moved by any suitable means, either manually as shown in Figure 10, or automatically, as in Fig. 35. The latter is necessary, however, whenever accuracy is required; and to prevent waste of the sensitive surface by moving when nothing is to be recorded, I employ an automatic starting and stopping device

which liberates the driving mechanism and stops it again at the proper times thus feeding the strip along only when needed. I utilize this "pattern" for reproducing the
5 pulsations or variations recorded thereon, in different ways, as by causing it to vary a beam of light, to vary the resistance of electrical conductors, to produce vibrations in an athermanous substance, or otherwise, as
10 may be preferred by the operator—for all of which I have given full and explicit instructions herein.

The following description will illustrate one way in which this principle of my process may be carried out. Supposing that the
15 image or form on the pattern is transparent, and that the intensity or extent of the pulsations recorded thereby is shown by the varying width of the image at different
20 points, I arrange the light to shine through the slit as when making the pattern (the shutter being now removed) and feed the strip past the slit at the same speed as before. It is evident that the quantity of light
25 which can be passed through the strip at any point of its length, as it is moved past the slit, is governed by the width of the transparent image at that point (as seen in Fig. 4, where *m* represents the slit or opening
30 through the partition), and that the quantity of light passing through it will, therefore, be varied precisely in accordance with the original pulsations or phenomenon which controlled the formation of the pattern.
35 If the original influence was a varying electrical current, we now have a beam of light varying in the same way, and can reproduce the variations of the original current by throwing this light upon a suitable
40 current-controlling device, as a selenium cell, arranged in an elongated form like the slit, and varying its conductivity in proportion to the length of it which is exposed to light by the varying width of the transparent
45 portion of the pattern or strip, as already explained. As the width of the transparent part before the slit increases more light will pass, a greater length of the selenium will be illuminated by it, its conductivity will be correspondingly increased
50 and a stronger current will be allowed to flow through it and through the circuit of which it forms a portion—and vice versa. When the light is entirely cut off from the selenium,
55 its resistance is so great that the current is (or may be) wholly prevented from passing through it. Thus the pattern can produce intermittent or undulating currents corresponding to the curves or forms
60 upon it. In order to produce alternating currents, I arrange the selenium in two parts or sections, each section adapted to send whatever current penetrates it through the circuit in a positive direction. As the
65 pattern allows one section to be exposed and

lighted up, a current will be sent through the circuit in one direction, and vice versa; and in either case the strength of the current will be governed by the amount of light transmitted by the pattern. Any desired
70 variations can thus be produced in electrical currents by using a suitable pattern. These currents can be utilized on the spot, or can be sent through the circuit to a distance, and, if desired, can be there repeated and
75 sent on in a manner well known to electricians, and finally utilized in a telephone or electrical receiver of any kind.

One current-controlling device can have several adjusting currents conducted through
80 it, and can simultaneously and similarly control them all. As each current can be sent through a separate circuit to a different place or places, I can simultaneously reproduce the sounds or other phenomena recorded
85 on the pattern at all of those places.

In using the pattern, I am not limited to one slit, as in making it, but I employ as many slits through the screen or partition as may be desirable, and provide each slit
90 with a selenium cell or other device for utilizing the light passing through the pattern at that point. It is evident that a given part of the pattern will pass before the successive slits at different times and that the
95 greater the distance between two slits, the longer the time it will take the pattern to pass over one to the other. I employ the successive slits with their selenium cells for extending the area over which sound can be
100 heard—for example, by producing the sound first at the instrument, by the light from one cell; then I utilize the light from the next cell (when the given part of the pattern reaches it) to send a corresponding current
105 to a sound-producing device at a point where the original sound has become weakened by passing through the air; and in like manner I reinforce this fresh sound at a proper distance farther on, by a current from the third
110 slit and cell, and so on, through as many stages as desirable. I adjust the distance between the slits so that the time occupied by the pattern in passing from one slit to the next will be the same as that occupied by the
115 sound produced at one stage to pass through the air to the next. By this means, the current arrives at the latter point and produces the sound, at the same instant that the original sound is heard there, and the two combine without interference. In this way, I repeat the sound from stage to stage in any
120 direction or in all directions at the same time.

Many other improvements are fully described herein.

Having thus given a general reference to the nature of my invention and indicated its main features I will now describe in detail the methods which may be employed for
130

carrying it out and apparatus or forms in which it may be embodied, reference being had to the accompanying drawings forming a part of this specification and which show
 5 so much of my apparatus as is necessary to illustrate the invention herein claimed—each figure representing as much of the apparatus as is required for explaining or understanding the principles and operation
 10 of the parts intended to be illustrated thereby.

In these drawings: Fig. 1 is a diagrammatic view illustrating the defective result of attempting to produce a phonograph
 15 record by indenting the blank. Fig. 2 is an edge view of a speaking diaphragm having a shutter mounted thereon such as may be used in carrying out my invention. Fig. 3 is a view partly broken away showing a
 20 speaking diaphragm carrying a shutter, a source of light and a roller carrying a sensitive strip exposed to said light through an opening controlled by said shutter. Fig. 4 shows at the left a plan view of the sensitive
 25 strip and rollers and at right an enlarged plan view of a portion of the strip having the photographic record thereon. Fig. 5 shows two forms of shutter mounted on diaphragms which may be used in carrying out
 30 my invention. Fig. 6 is a plan view of a strip having thereon a sinuous record produced by the shutter shown in Fig. 5. Fig. 7 shows two additional forms of shutters which may be used. Fig. 8 shows the form
 35 of record produced by the shutter shown in Fig. 7. Fig. 9 shows a series of shutters mounted across the diaphragm with their edges meeting or overlapping. Fig. 10 is a vertical sectional view of one form of apparatus
 40 arranged for making the negative or pattern and moving it along by hand in carrying out my invention. Fig. 11 is a diagrammatic view showing means for reproducing and utilizing an opaque record
 45 by reflected light. Fig. 12 shows an electric circuit having a selenium bar therein adapted to be affected by light from my record. Fig. 13 is a similar view showing a flat selenium cell with a lens for concentrating
 50 the light from the record on it. Fig. 14 is a plan view of a partition having a series of light openings or slits therein for taking light from different parts of the record. Fig. 15 shows a record strip across a series
 55 of light openings and a plurality of means for utilizing or transmitting said record. Fig. 16 shows the photographic pattern produced by a succession of separate exposures. Fig. 17 is a similar view made by using a
 60 modified form of shutter. Fig. 18 shows two selenium cells arranged for exposure through a single opening to produce alternating current. Fig. 19 shows a record such as will be produced by the upper shutter

shown in Fig. 7. Fig. 20 is a sectional view
 65 of an apparatus having a mirror on the speaking diaphragm for reflecting light to the record surface. Fig. 21 is a sectional view of an apparatus which may be used
 70 either for making or utilizing the record. Fig. 22 is a view more in detail of a plurality of means for utilizing a single record as shown in Fig. 15. Fig. 23 shows a plurality
 75 of light openings for a single strip with means for adjusting their relations or timing. Fig. 24 is a similar view of a modified construction. Fig. 25 is a plan view of a disk record having the photographic im-
 80 pressions thereon in a spiral. Fig. 26 is a perspective view of a cylinder having a spiral record thereon. Fig. 27 is another form of record having thereon a single circular pattern. Fig. 28 is still another form showing separate parallel patterns. Fig. 29 is a
 85 sectional view of an apparatus for taking and reproducing the record having a lens for concentrating the light upon the strip. Fig. 30 is a view of a divided shutter and two selenium bars for producing alternating
 90 current. Fig. 31 shows a modified form of divided shutter mounted as a key. Fig. 32 is a view of another arrangement. Fig. 33 is similar to Fig. 18 showing the electrical connections more clearly. Fig. 34 is a dia-
 95 grammatic view showing means for producing, transmitting and repeating electrical impulses through several successive stages or circuits. Fig. 35 is a sectional view of an apparatus for receiving a message sent over
 100 the line including automatic starting and stopping mechanism for the receiving strips. Fig. 36 is a detail view of a portion of the stopping mechanism. Fig. 37 is a sectional view of an apparatus adapted to strengthen
 105 light pulsations which are recorded or re-produced. Fig. 38 is a general view of the apparatus disclosed in Fig. 10 but more in detail showing more clearly the arrangement and connection of the parts. Fig. 39
 110 is a horizontal section on the line $x-x$, Fig. 38. Fig. 40 is a more complete detail view of the arrangement illustrated in Fig. 15. Fig. 41 shows means for adjustably mounting the lens in its relation to the slit or light
 115 opening. Fig. 42 is a similar view showing several lenses and slits. Fig. 43 shows a series of lenses each being separately adjustable. Fig. 44 shows the means for mounting and operating the diaphragm carrying the shutter in Fig. 38. Fig. 45 is
 120 a perspective view of the doors for the apparatus shown in Fig. 38. Fig. 46 shows the arrangement and connection of parts for receiving an incoming message. Fig. 47 shows the arrangement of parts for oper-
 125 ating the starting and stopping mechanism at the receiving station by means of a selenium cell. Fig. 48 is a view partly in

section of motor operated mechanism for moving the record strip. Fig. 49 is a detail sectional view of one of the reels carrying the strip. Fig. 50 is a view of a reel looking from one end. Fig. 51 is a similar view looking from the other end.

For convenience of description I will call my apparatus a phonograph, but I expressly declare that I do not intend thereby to limit the scope of my invention to what is commonly known as or done by the so-called "phonographs," or to narrow or restrict the scope of the invention in any way, but use the term merely for convenience.

The great trouble with phonographs heretofore is that they have undertaken to record and reproduce delicate air pulsations by mechanical means. In the first place, the diaphragm as heretofore arranged cannot possibly record the true form of the sound waves, nor even the actual mode of vibration of a free diaphragm under the influence of the sound pulsations. The vibrations of the recording point or tracer, in the center of the diaphragm, do not truly represent the vibration of the diaphragm at any point except at the center. And while it is practically sufficient for ordinary purposes, for other purposes it would be desirable to record the vibrations of the other parts of the diaphragm with their changing nodal points and points of maximum motion. This I accomplish by independent sectional shutters attached to different parts of the diaphragm each of which makes its separate record of the vibrations of the part to which it is attached, or otherwise. But even if the vibration of the center of the diaphragm truly represented the sound waves, it would be impossible for it to truly record them because the metal point thereto attached is hindered in its vibrations by the labor of impressing its motion in the foil or other material used in its place. This resistance not only retards the diaphragm itself, but it retards it in a very variable manner. When the tracer point reaches a soft, thin or unsupported spot in the foil, it moves farther than the average, while thick or hard spots, etc., reduce the motion below the average. A score of other faults could be mentioned, but the most important is that when the point is descending the pressure of the foil against its inclined forward surface retards the motion of the diaphragm; but when ascending it hastens or assists it, thus deforming the vibrations of the diaphragm itself. This will be understood by examining Fig. 1, where *a* is the tracer point, with its front surface inclined backward to prevent clogging. The dotted line *b b* represents the original level of the foil which is fed along in the direction of the arrow and the solid curved line

shows the actual form of a supposed sound wave, while the dotted curve shows the form which the point will tend to make—and this discrepancy will be aggravated by the stiffness of the foil, the weakness of the vibration or the spring of the tracer and many other causes. As the perfection of the speaking depends entirely upon the exactness with which the natural sound waves are reproduced, it is evident that a method which does not record the correct form of a single one of the sound waves out of the hundreds or thousands which occur in each second of time to produce the sounds we hear, cannot possibly reproduce correctly the original sounds. All these difficulties I obviate by dispensing entirely with the tracer and its spring and the foil or any substitute for it; or any mechanical pressure devices whatever, for recording the sound-waves tangibly and employ means for recording the vibrations of the diaphragm which neither retard nor accelerate them, but will truly record the most extreme and violent or the gentlest pulsations and every one exactly as it occurred. This I do by causing the diaphragm as it vibrates to vary the quantity of light which passes through an aperture to a surface sensitive to light by which the sound waves are fixed and recorded. No matter how many or how different the sounds which have joined in producing composite sound waves which strike the diaphragm, the true number, intensity, and form of every one of them will thus be preserved unchanged by the process of recording. This record I call the negative and from it I can reproduce copies or duplicates in the same or other materials and can use it or them for the reproduction of the sounds recorded thereon. I also in the same way record any other phenomena such as signals, electric currents, and other influences capable of moving the diaphragm.

In the second place, even if the foil or matrix usually employed has been shaped exactly corresponding to the sound waves, it would be impossible to exactly reproduce those sound waves by moving the curved surface under a point attached to the sound producing or speaking diaphragm and causing the latter to vibrate, as is usually done, for several reasons; and even if it could, the excessive pressure of the point on the rising sides and tops of the curves soon wears them and changes their shapes from the true curves. No material now used could stand such use without being rapidly worn out of shape and destroyed. Moreover, the extreme rapidity of the vibrations renders it impossible to perfectly perform any mechanical movement, *i. e.*, to apply force in a constantly varying manner and in opposite directions by mechanical devices with

such rapidity and precision as is here necessary. The great desideratum is, wherever practicable, to avoid not only hand labor in making or finishing any of the parts, but

5 to avoid merely mechanical devices entirely, and to provide means by which as much as possible of the work may be performed by the perfect-acting, unwearing, and swift-moving forces of nature. I, therefore, operate the diaphragm by throwing upon it light whose intensity is varied correspondingly with the form of our sound waves as described, which, as is known, causes a diaphragm to vibrate and produce 10 the sounds corresponding to those waves. This I accomplish by passing a powerful beam of light through the negative I have before prepared, to and upon the diaphragm. This light passes through a narrow slit corresponding to the one used in making the negative, and by moving the negative along behind this slit at the same speed as when making the negative, it is evident that the original variations in the 15 intensity of the light are exactly reproduced and if they are thrown upon the diaphragm, it will give out the same sound as that which originally caused it to vibrate. Thus, instead of trying to shove the diaphragm back and forth by machinery some hundreds or thousands of times per second, at a constantly varying speed, and making each motion exactly according to a prescribed pattern, each one of which may be 30 different from any of the others, I accomplish the same end by the slow motion of a single piece or negative and causing that to control the action of a beam of light directed upon the diaphragm.

40 Instead of the light beam passing through a transparent negative it may be thrown upon an opaque negative and the image of the pattern be reflected therefrom and utilized, or the intensity of the light thrown upon the diaphragm may be automatically varied by the negative in many other ways.

In making the negatives, the sound to be recorded is caused to impinge upon a vibrating diaphragm, which is properly 50 damped and arranged, as will be readily understood by those versed in telephony. To the center of the diaphragm *d*, Fig. 2, is fixed a vertical screen or shutter *s* of mica or other light and stiff material being attached by its center and the outer corners rounded off a little to prevent their contact with the diaphragm during its backward vibrations, or to the left. It projects out at right angles to the plane of the diaphragm 55 and is made opaque to prevent the passage of any light through it.

Fig. 3 is a vertical plan view; *s* is the shutter, *d* the diaphragm, *l* is a powerful light throwing a beam of nearly parallel

rays across the screen or partition *S*, which 65 has a long narrow slit *m* in it, through which the light passes and strikes the prepared surface, which in this case is represented as a strip of sensitized paper, fed at a regular speed over the rollers *R R*. As the diaphragm shutter *s* normally stands, its edge 70 shuts the light off from one half of the slit, and in vibrating it covers up more or less of the strip, according to the extent of the vibrations. The paper strip being carried 75 along behind the slit *m*, Fig. 4, the edge of the shutter will describe a curved line at the junction of the part *e'*; not acted upon by the light, and *e*, which is acted upon; and by proper treatment the latter may be 80 dissolved away or otherwise made transparent in any well known way, as will be at once understood by photographers. This curve or junction line, of course, represents the motion of vibration of the center of the 85 diaphragm under the action of the sound waves or pulsations of the air. The forms of these waves as is well known, are the resultant of all the sounds which would be heard together if the ear was substituted in 90 the place of the diaphragm and the prominences of the transparent part represent condensations of the air at the instants that those parts of the strip were behind the slit and exposed to the light passing through it while the hollows represent rarefactions produced by the sound waves or pulsations. 95

By varying the relative distances of the light, the shutter, and the slit or sensitive surface from each other, we can, increase the 100 apparent amplitude of the sound waves as recorded on the sensitive surface, without changing their forms. For example, if we move the light from *l* to *l'* in Fig. 3 at half its former distance from the shutter *s* or 105 arrange the strip twice as far from the shutter, we shall double the amplitude of the curves on the strip produced by the vibrations of the shutter. In the same way, we can amplify the recorded vibrations in any 110 other proportion desired, and the greater that amplitude is the more powerful will be the effect of the negative or pattern when employed in reproducing phenomena recorded thereon. And it must be understood 115 that in all cases the relative distances of the parts are to be such as will enable the minute vibrations of the diaphragm and shutter to produce upon the record curves having sufficient amplitude for working 120 purposes. This method of amplifying the vibrations is often important and can be applied for strengthening pulsations or variations in light or electrical currents as well as in sounds. I would here remark that 125 the diaphragm and shutter may be caused to vibrate not only by the direct impact of sound pulsations, as before described, but

also by other means, as by magnetic attraction, connection with vibrating bodies and the like. This is illustrated in Figs. 21 and 37, which show the combination of my telephone and the phonograph, as fully herein-after described. My apparatus is capable of recording any phenomena which can actuate the shutter or device which varies the beam of light,—and that device may, of course, be actuated in any suitable manner, as will be in the precise manner described.

Instead of a shutter manipulating the light rays we may use a plane mirror attached to the center of the diaphragm and place the light in front but a little to one side; the light beam will be reflected to the other side of the center, or normal, as seen in Fig. 20, where the light from l is properly directed upon the mirror and reflected through the tube and the slit m upon the strip P . Now, when the diaphragm vibrates the spot of light, it will also change its position, and the amplitude of its vibrations will be greatly increased by the angle between the light and the central line or axis of the mirror. The amplitude of the curves can also be increased to any extent by removing the strip P to a suitable distance from the mirror, as described with the shutter. But I prefer the way before described for making negatives for this purpose, although any suitable method may, of course, be used which will accurately record the forms of the sound waves upon the negative—which is the object sought.

If, instead of an opaque shutter on the diaphragm, we have a vertical transparent strip across said shutter, the light will reach the paper strip behind the screen only through the intersection of the two slits in front of it, forming merely a square spot of light, as shown by Fig. 5 at the intersection of the two slits n and m . The vertical slit on the mica should make the light beam of about the same width as the stationary horizontal slit in the screen. As the diaphragm vibrates and the paper is moved along, we produce (after dissolving out the parts exposed to light, blacking the rest, soaking in oil or otherwise rendering it transparent) a narrow, transparent curve on the paper strip, as represented in Fig. 6. Instead of the vertical strip, we may use a transparent spot at the point which will fall on the center of the stationary slit when the diaphragm is still, as seen at n' on the upper shutter shown in Fig. 5. This also makes a negative strip, like Fig. 6. Another way is to have two shutters, one on the diaphragm, as before, only larger, and the other stationary and parallel to but not touching it. These shutters are painted, or otherwise treated to make them opaque up to a certain point, the rest being transparent.

These opaque edges are notched so that at their junction they lap so as to form square or diamond spaces which are transparent, as in Fig. 7, where s is the vibrating shutter and s' is the stationary one. In this case, the slit in the screen before the paper strip is placed vertically and the paper is fed past it horizontally. Consequently, as the movable shutter s is vibrated to and fro before the other, these transparent squares or diamonds become alternately larger and smaller. But they should not quite meet nor be quite extinguished even by the greatest vibrations of the diaphragm. The result is to produce on the opaque negative strip transparent lines of varying width, one of which is shown enlarged in Fig. 8. If a narrow beam of light is sent through it, it will be more or less obscured at different places along the strip, *i. e.*, the quantity of light allowed by the transparent parts of the strip to pass through the slit will be increased or decreased corresponding exactly to the pulsations of the diaphragm (or the sound waves) not only in number and intensity, but also in the form or manner of vibrating.

At 2, Fig. 8, is seen a fine opaque line in the middle transparent strip. This is made by placing a fine wire across the center of the stationary slit m to stop the light and indicate the center of the negative strip. Its convenience will be manifest. In practice, the stationary notched shutter s' is not necessary as the slit m is sufficient in connection with the vibrating notched shutter, as seen by the lower figure in Fig. 7 which shows how the lateral vibration of the shutter with its transparent notch will vary the amount of light passing through the stationary slit m .

When desired to copy the pulsations of the diaphragm with the greatest possible exactness and completeness, the shutter should be divided or sectional, and each section may be notched like the lower shutter in Fig. 7 and will produce on the negative its own independent bulbous record like that shown in Fig. 8, although there will of course even in this instance be some overlapping of records.

In Fig. 9 d is the diaphragm, 2 is the shutter at its center and 3 and 4 are other small shutters attached to different parts of the diaphragm. Each shutter having its own slit m and producing its own individual record or pattern strip as already explained for the single shutter, each one being arranged as described for shutter S , would make its own wave or record of the vibrations of that part of the diaphragm to which it was attached and all of them would thus show the movements across the whole diaphragm, and the relative times and posi-

tions of the nodal points. In this way, it is evident that the action of all parts of the diaphragm will be correctly recorded on the negative and as the nodal points change from one section to another, as different sounds act on the diaphragm, so will the bulbous lines on the negative change their forms. And when they are in turn caused to vary the light thrown upon a speaking diaphragm D, Fig. 10, they will reproduce the original pulsations of diaphragm *d* with its varying nodal points and will correspond more closely to the original than would be the case if only the vibrations of the center of the diaphragm were recorded on the negative. The shutters are easily attached to the diaphragm by their centers and being inclined slightly somewhat like the slats of a window blind, similarly to the closed slats of a window blind, their edges will lap without touching each other.

It is evident that when a correct negative is once obtained perfect copies can be produced not only by photographic, but also by ordinary printing processes, or even by mechanical means at a merely nominal cost, even for the most elaborate negatives.

Having thus explained the principles of my invention, Fig. 10, represents an apparatus which I have devised for carrying out my method arranged more particularly for making negatives or patterns. At A is a roll of the prepared negative strip wound upon a bobbin which is mounted in journal bearings in any convenient way. This strip may be of any suitable thin and flexible material which may be strong fine paper, but I prefer what is known as paper parchment, although many other substances may be used. It should be covered with a thin film made very sensitive to light by any of the instantaneous processes employed in photography, although a dry process will be most convenient with this form of negative. After being properly coated and sensitized, it should be carefully dried, rolled up, and protected from light or damp until ready to use it. It may be thus coated and sensitized either before or after being cut up into strips of width suitable for use, but in the latter case, care must be taken in the cutting not to disturb the adhesion of the film to the strip. A suitable width is 1/2 or 3/4 inch and the length will, of course, be governed by convenience or the choice of the operator.

The roll A is free to turn, being held only by the spring 1 pressing upon it sufficiently to prevent it from turning faster than the strip is needed. From A the strip passes over the flanged rollers R R, Figs. 3, 4 and 10; at R' is a rubber-faced roller which presses the paper strip between itself and R tightly enough to prevent the slipping of the strip. It also fits between the flanges of

the roller enough to carry that along with it. If desired, it can also press lightly on the roller A' to assist in rewinding the strip upon it. To this roller can be applied the power which feeds the strip along before the slit *m* in the screen or partition S. For experiment or common telegraphic purposes a crank may be attached to the roller R' or R, as shown in Fig. 10, or the strip may be otherwise fed by hand. But when accuracy is required, some motor should be employed which will give the negative a perfectly uniform and known rate of speed. These are not new and need not be described, as they form no part of my invention. The motor may be attached to or contained in the box or frame of the phonograph or otherwise connected as preferred. The strip being thus fed along at a uniform speed it is wound upon a second roller A' or may simply be fed loosely into the bottom of the box or case of the phonograph after exposure to the varying light. It will now remain unchanged if kept from light and damp, for days or even weeks, or, on the other hand, it may be at once developed, intensified, fixed, or otherwise treated to render the image permanent,—according to the process employed or the effect desired. All of which will be at once understood by those versed in photography, who will be enabled from the foregoing description to readily make a negative strip having the characteristics required and will probably prefer the gelatino-bromid process. If the paper seems to have a greasy nature, it may, before applying bromid emulsion, be coated with four per cent. solution of white of egg to which sufficient chrome-alum has been added to give it a slight bluish tinge. This will insure the film adhering perfectly. But it will seldom be required if a good quality of paper or parchment is used. These strips being fixed, they may be treated and used in different ways. The parts acted upon by light may be made transparent and the rest blacked and rendered more opaque and the strip used by transmitting light through it; or the strip may be left opaque and used by reflected light—in which case the parts acted upon by light should be made as white or brilliant, and those not acted upon as black and absorbent of light as possible, all of which can be done by any one out of many well known ways, and detailed directions are not necessary. For example, a strip to be used by transmitted light may have the dark parts blacked with carbon-ink, flexible black varnish, or otherwise, and the lights rendered transparent by dipping in castor oil thinned with absolute alcohol. The finished strip being again wound upon the wheel or roller A and properly arranged in the phonograph, we can reproduce the original variations in the first beam of light, in another

beam of light, by feeding the strip before the slit m at the same speed as when making the negative and throwing the beam of light through it as it passes the slit. To do this, the diaphragm d with its shutter is removed—the upright frame which holds it being arranged to slide on a foot-piece which fits in grooves so that it may be slid into its place for use, or moved back out of the way, as desired.

Fig. 21 is a horizontal sectional or plan view of the apparatus (arranged for reproducing the sounds or phenomena recorded in the negative or pattern), and shows the shutter and diaphragm carried on the same frame or base as the telephone EL , which slides in grooves in the pieces $t\ t$, and the dotted lines show the position of the base when slid back far enough to get the shutter out of the way for our present purposes, but not admitting any light to the interior of the apparatus. The mouth-piece O is, of course, closed when thus utilizing the negative. The square chamber which contained the diaphragm is now empty or free and allows the light l to shine unobstructed across it to and through the slit m onto and through the strip which is rapidly fed before it, whereby the light which passes through the strip is varied in precisely the same manner as the original beam of light was varied by the shutter on the diaphragm d , *i. e.*, the greater the proportion of the strip which is transparent, the longer the beam of light which is passed through it, and vice versa (see Fig. 4). This light can now be used to produce corresponding variations or pulsations in sound, electric currents, magnetic attractions, etc., as desired. We can reconvert this varying light into sounds in different ways. It may be passed through a plano-convex or, rather, plano-cylindrical lens p , Fig. 10, or any suitable optical devices to widen and disperse it properly and be thrown directly upon a thin hard-rubber diaphragm D properly arranged for speaking or giving out sounds. Or, in place of the lens p a selenium bar or cell may be arranged to receive the light and thereby vary a current of electricity flowing through it, as shown at p in Fig. 21, which current may then be conducted to one of my telephones (described herein) which is substituted for the diaphragm D and the sounds will be produced by it with any desired loudness, or the current may be conducted by wire to any other instrument or place in the same way as in telegraphy and there converted into sounds or utilized for any other purposes, as in Fig. 21, where a current from D is represented as conveyed to a telephone T' at one place and to an electrical receiver in any suitable kind EL' at another place.

When selenium is used for receiving the

light and varying an electric current, it may be either in the shape of a bar p covering the slit m , as shown in Figs. 12 and 21, or that of a flat cell p' in Fig. 13, where the light passing through the negative or pattern D and the slit m is converged by the lens p to a focus, upon the selenium cell p' . Or, for producing an intermittent current it may consist of two selenium cells or bars suitably arranged as shown in Fig. 18. The same arrangement is used in connection with patterns like Figs. 4, 8 and 17 for producing alternating currents or undulating currents of alternately opposite polarity. The two cells are arranged end to end with their approximating ends at the central line 2 of the pattern strip so that one cell or bar is opposite one half of the slit m and the other bar or cell opposite the other half. Each cell is arranged to send whatever current flows through it in a direction opposite to that of the current from the other cell, in any well-known or suitable manner and each may be supplied with its current from different ends or sections of the same battery or from separate batteries, as shown in Figs. 30 and 33, where the two sections of the selenium are inserted in derived circuits or branches of the main circuit $w\ w$. In either case, the electric current is arranged to flow through the selenium by proper conducting wires and the varying quantity of light which falls upon the selenium will correspondingly vary the current flowing through it, as is well known to electricians.

A strip or pattern, like Fig. 17, thus employed, will produce an alternating current, whose changes of strength and polarity will be sudden or instantaneous—for each section of the cell will be at once lighted for the whole length of the signal or form on the strip, then as suddenly shut off from all light, and the other cell or section will be lighted and operated by the form on the opposite half of the pattern strip. A pattern like Figs. 4 or 8, however, produces the changes of strength and polarity gradually. When designed to be used with a divisional selenium cell, they should, of course, be made by a divisional shutter on the diaphragm, as shown in Fig. 30. In using such a shutter to produce negatives, it should be arranged so that the central vertical line or division of the shutter will fall on the central line of the slit m , which should also be made preferably in two parts in different planes, as shown by the position of r and r' in Figs. 30 or 31. When arranged as in Fig. 30, the opaque part s of the shutter stands between the light and the part r' of the slit and s' covers up the slit r , as will be understood from Fig. 32, where the parts are so arranged. Now, when the shutter vibrates to the right, s' uncovers more or less of slit r ,

and when moving to the left, the part r' of the slit is similarly exposed by the removal of s . The sensitive surface being fed down past the slit, a pattern is produced like Fig. 4 or 8 but with the two halves independent, and possibly, dissimilar,—each corresponding to the movements of its own half of the shutter. By now moving this pattern (when finished) past the slit again after arranging a sectional selenium cell behind it with each section of the selenium behind the corresponding section of the cell (and the shutter being now moved back out of the way) we produce alternating currents whose variations in strength and polarity will correspond to the original vibrations of the shutter and, therefore, of the force which moved it—the principle involved in making and using the pattern being precisely the same as already described. I would here remark that the method of constructing selenium cells is now well understood and any known or suitable method or arrangement may be employed.

The negative may, of course, be taken on glass instead of paper and arranged to be properly moved before the slit and light. Any suitable material may be used, whether transparent or opaque, flexible or rigid, plane or curved. When the negative strip is required to be very narrow in order to save room instead of the light falling directly upon it, the varying light beam may be received upon a lens and converged to the desired size before being thrown upon the sensitive surface. The negative in Fig. 10 would then be fed along at D instead of between p and m . Or, in Fig. 13, the negative would be at p' while receiving the photographic impression. Fig. 29 illustrates this arrangement. The light from l , after being varied by the shutter s , passes through the slit m and is converged by the lens p and then falls upon the negative P. Of course, the same arrangement may be used with a speaking diaphragm D or other suitable device substituted for the negative or sensitive surface. As the interior of the camera is thoroughly blacked, as already stated, it absorbs all superfluous light and improves the effect.

When using an opaque strip or negative, the sound waves or, rather, the variations of light produced by them are recorded in the same way as already described. But to reproduce those variations the strip is fed along with the printed or formerly sensitive side outward in the path of a beam of light by which it is powerfully illuminated and the light reflected from it is utilized instead of transmitted light. Fig. 11 shows an arrangement which may be employed. l is the light which passes through the alum-water cell 2 through the tube 3 and illuminates the moving strip or pattern 4 or P. 5 is a tube with blackened interior, each end having an aper-

ture corresponding to the slit m which would be used with a transparent pattern and so directed toward the strip that only the light from that part of the strip which would be covered by the slit m can pass through both apertures—all of which will be readily understood by photographers. This light is then received by the lens or other suitable optical device p and properly thrown upon the diaphragm D as before. The lens p may be replaced by the selenium bar or cell and the diaphragm D by one of my telephones, etc., exactly as before described for transmitted light. The distance of the illuminating arrangement from the negative strip is merely sufficient to thoroughly light up the field covered by the tube 5. Tubes 3 and 5 may be of any suitable size, length, and material, all of which may be left to the judgment of the operator, who should arrange the apparatus according to good photographic practice. By following the directions herein given nothing more than good judgment is needed to enable any one skilled in photography to attain perfect success either in making negatives by my method for any desired purpose, or in practically using them afterward.

Instead of a negative arranged as before described, it may be made alike across its whole width and its transparency varied so as to be more or less opaque at different parts of its length. Or an opaque strip may be similarly varied from white through all the shades to black so that a given cross-section of the strip will reflect more or less light at different points. Such strips will light up the whole length of the selenium or other device all the time and operate by the varying intensity of the light instead of by varying the length of the cell exposed to light. Or the strip can be so prepared as to show analogous gradations of phosphorescence, when suitably treated, and throw out a light of greater or less strength corresponding to the variations in the beam of light originally employed in making the negative whereby it will be enabled to reproduce those variations at any time, which is the object and function of the negative or "pattern". Or, the desired effect can be attained in many other ways. But for photographic and other reasons, I prefer that the negative be made as before described, with the different portions entirely distinct and with the part that is transparent or white made as transparent or white as possible, and that part which is opaque or black made as strongly so as practicable. The pattern may be made upon a long narrow strip, as described, or arranged spirally over the surface of a plate, as in Fig. 25, or a cylinder of any suitable size, shape and material, as in Fig. 26. By making it in a circular form, as in Figs. 27 and 28, and running it around, it will continue to repeat the same

sound, word, or phrase, as long as it is turned. Fig. 27 is a strip having a single pattern or image upon it while Fig. 28 has a number of parallel images or patterns; the ends of the strip are properly cemented or fastened together.

Instead of the hard-rubber diaphragm D one of celluloid may be used, also soft vulcanized rubber, thin elastic brass, and German silver, and other materials which are capable of being vibrated or acted upon, as described, when properly exposed to the varying light or other rays. The diaphragm d may be made of any of the materials used in telephony, which are suitable for the employment to be made of it in this process.

The light employed for making the negative should be strongly actinic and may be direct sunlight or electric or other artificial light having sufficient actinic power for instantaneous photography. It should be arranged in a chamber W, preferably with a reflector or other means for making the rays nearly parallel, *i. e.*, into a beam suitable for the purposes of this invention, and only this beam should be admitted to the diaphragm chamber. The rays may proceed directly from l (Figs. 3 and 10) as a luminous center, or they may be brought to a focus at any point between l and the shutter s , as seen in Fig. 3, where l and l' represent two such foci with the method of amplifying the effects produced by the vibrating shutter—the luminous center or focus being advanced nearer to the shutter until the desired amplification is effected. The effect is practically the same, whether a luminous point is placed at l or a beam of rays is brought to a focus there and diverge thence sufficiently to cover the slit or slits m through the partition S of the diaphragm chamber. At 2, Fig. 10, they pass through a glass cell filled with alum water to stop the heat without diminishing the light. They then pass through an aperture of suitable size across the diaphragm chamber where they are manipulated by the shutter s and through the slit m , as already described. For using the negative so strong a light will not always be needed and a good kerosene lamp will answer for most ordinary purposes. Gas light is not suitable unless a steady flame can be obtained, as a flickering light will interfere with the perfection of the speaking. For purposes requiring accuracy, however, a light should be used having ample actinic power and the stronger the better. No harm can be done by having a light unnecessarily strong, as it can not be strong enough to do any harm, although proper care must, of course, be taken when the alum-water cell is not used to avoid the injury of the pattern or other device by the heat rays contained in the light. And I would here remark with regard to the alum-water cell or its equiva-

lent that, although not essential, its use will generally be found advantageous in making a photographic pattern and in using a pattern in connection with selenium cells. But when other substances or devices are used which are sensitive to other forms of radiant energy, its use may be needless and even objectionable as stopping the very kind of radiant force which acts upon the sensitive substance or device. It should, therefore, not be used in connection with a hard-rubber speaking diaphragm or in other cases where the heat rays are the acting force concerned. It is also found by experiment that the effect is improved by using a mirror or reflector instead of the lens p , Figs. 10 and 11, when the rays are intended to act upon a rubber diaphragm or other device operated by the thermal rays of the light. These hints will enable the operator to use or omit these parts according to the use he is making of the apparatus.

The whole apparatus is inclosed in a close box or casing, as shown in Figs. 10, 20, 21, and 29, to exclude external light, particularly from the negative. The light chamber W should be so tight that none of the light can penetrate the partitions around it except through the cell 2. The diaphragm chamber is also inclosed on all sides except the one facing the sounds to be recorded and the only opening on that side is through the bell or mouth-piece O conducting the sound to the center of the diaphragm. All the interior surfaces are made densely black in order to absorb and prevent the reflection of any light that may find its way inside. Suitable openings or doors are provided wherever necessary for giving access to the different parts which may be arranged to suit the convenience of the operator. This care about the light is required more especially while making the negative. For speaking purposes, much less caution is needed. When the apparatus is used to enable one light to control another and stronger one, the former is thrown upon the other side of diaphragm d which controls the light l , as illustrated in Fig. 20, where a properly varied beam of "light" from the left may act upon one side of the diaphragm d , which then varies the light coming from l by means of the mirror shown attached to its right side. It can, of course, control such light also by the usual shutter, or other devices, before described. O and O' are mouth-pieces or openings, one on each side.

When the instrument is used for speaking or playing in a large hall or in the open air, the sound, even if much louder than the original, will become inaudible at a distance from the phonograph. If desired to extend the area over which the speech, music, or other sound will be heard, it can be done

and to any extent by taking sounds off from different portions of the negative or strip at the same time. For example, if the music is indistinctly heard at a distance of 100
 5 feet from the phonograph, I reinforce it so as to be as loud as at the instrument itself by taking the sound off from the negative strip through a second slit below the other. We know that sound travels in air about
 10 1100 feet per second. It would be heard at a distance of 100 feet or $1/11$ second later than at the instrument. In order to send on a fresh sound and have it arrive there at the same time as the original sound so
 15 that there may be no interference between the weakened original sound and the powerful new sound, but both may join and coincide we take the new sound from the strip $1/11$ second later than the original. If
 20 the strip travels eleven inches per second, we simply adjust the second slit m' just one inch below the other m , Figs. 14, 22, 23, 24, arrange the light to shine through both slits at once, receive the light from m' upon a
 25 selenium bar or bars, conduct the current to the point where the sound needs reinforcing, and there convert it into sound by one of my telephones or any other suitable arrangement. It is evident that any given
 30 part of the strip will pass the slit m' $1/11$ second after it passes m and the same with any other distance. The strip is not really fed along so rapidly, but the proportion should be the same between the actual speed
 35 per second and the distance to be covered. Should it be desired to again reinforce the sound, say, 75 feet farther on, we add another slit and selenium m^2 $3/4$ inch below m' and so on indefinitely. In this way, the
 40 speech or music from my instrument can be extended over as large an area as desired and in all directions so as to be perfectly heard in every part. One selenium bar is capable of carrying a number of different cur-
 45 rents at once, each one sufficiently powerful to operate a loud-speaking telephone or analogous apparatus and each one will be similarly and simultaneously acted on by the varying beam of light and varied corre-
 50 spondingly by the selenium bar or cell. Fig. 22 is a diagram of the arrangement and electrical connections. The light which passes through the slit m produces the first or original sound at the instrument or any
 55 central position preferred, as by a loud sound-producing apparatus at T. The light passing through the next slit m' acts upon a selenium or other current-controlling device and sends out currents which will rein-
 60 force the original sound at the distance, say, of the circle $x-x$, where it is shown as reinforced at three different points in that circle. These second sounds are reinforced at the next stage or circle $x' x'$, at as many

different points as desired—shown as four— 65
 by currents produced by the light which passes through the third slit m^2 and acts upon a current-controlling device p^2 , through which flow the currents which ac-
 70 tuate the sound-producing apparatus at the stations 1, 2, 3, 4.

The current from the cell at the second slit m' is shown as passed through the primary wire of an induction coil I, the secondary coil of which sends an induced cur- 75
 rent through the different sound-producing apparatus shown as arranged to be each actuated by a division of the current. The entire current may, of course, be sent through all the instruments in succession. 80
 So also can a single current from the cell p^2 be sent through all the instruments in the circle $x' x'$ —instead of arranging a separate current for each and controlling all of the currents by the cell p^2 , as shown. 85

5, 6, 7, 8, are the points where the two circuits are divided into branch circuits; but the main circuits need not be divided at all, but each one may extend to and connect directly with the cell p^2 or coil I. 90

Any suitable electrical connections and any suitable form of currents may be employed as well understood by electricians. For such purposes, a slider or composer is arranged in the partition S, Figs. 10 and 95
 22, having the slit m at the top and others arranged at the desired distances below. A separate slider can be inserted for any new modification in the distances to be allowed for. If great accuracy is required in meet- 100
 ing some special case, the slits may be formed in movable pieces, which can be adjusted to and from m by screws with any desired minuteness, as shown in Figs. 23 and 24. In the former the slide S has 105
 marks along its edges for adjusting the position of the pieces carrying the slits which are then secured by the screws as shown. In Fig. 24 the slitted pieces are adjusted to and from m by screws through 110
 their ends held by a ridge level with the slit m . When the currents are to be sent to a distance or not to be heard simultaneously no such care is needed, but any desired number of slits can be used, and at 115
 any convenient distance apart, each with its selenium or analogous device, and each selenium can conduct and control a number of separate currents thus multiplying the number of separate currents that may 120
 be simultaneously taken off one strip or negative indefinitely.

In Fig. 15 several slits are shown through the partition or slider S. The bottom one throws its light on a lens which concen- 125
 trates it to a focus on a selenium cell, as shown, which is connected with a telephone by the conducting wires as usual. The next

one above throws the light upon the lens or other device p , which spreads or causes it to properly cover the diaphragm D for speaking. The two slits above illuminate
 5 two selenium bars, with their conducting wires for sending the currents to different instruments or places. At the top is shown the arrangement for speaking by reflected light. The slits may be arranged and used
 10 in any manner desired.

Instead of using the lights from the different slits for different purposes, as shown, the slits may all have selenium bars or cells behind them, or the lights passing through
 15 them may be utilized for any purposes desired.

Each bar or cell should be so inclosed as to protect it from all light except what comes to it through its slit. When any
 20 selenium is not wanted for use, its slit can be covered with a slide, as in Fig. 10, where only the central slit is used while making a negative or pattern, the slits above and below that being closed by their slides. In
 25 Fig. 22 the slit m^2 is shown with its slide in position ready to be shoved down and cover the slit, or the selenium merely disconnected from the line or conducting wires, or by opening the circuit. When quite a
 30 number of slits are to be used at once, they may be arranged in a curve with the light in the center and the paper strip rest on a curved glass surface to support it and keep it in position. This curved form of slider
 35 is seen in Fig. 22. In this case the side of the strip which carries the image should be outside to avoid rubbing it over the glass. It will, therefore, be seen that I can at the same time convert the forms recorded on
 40 the negative into sounds and transmit them elsewhere; I can transmit them to any desired number of places simultaneously; or I can take off the sounds any desired number of times and reproduce them with any
 45 desired intervals of time between the successive series or repetitions of the sounds, signals, or other phenomena which are being reproduced, or I can convert the varying light which passes through into any
 50 desired number of correspondingly varying electric currents, each having any desired strength, and each of which can be utilized for any desired purpose.

By arranging the diaphragm d , or its
 55 shutter s , to be operated manually, feeding the strip slowly and vibrating the shutter in a manner similar to that used in sending the ordinary Morse signals with the ordinary key, the result would be a strip like Fig. 16,
 60 with transparent lines across it. The shutter can, of course, be actually arranged on a sort of key and be vibrated manually before the slit m to intercept the light properly. Fig. 31 shows this device adapted for

producing alternating currents. The parts 65
 s and s' are opaque, the rest of the shutter transparent. The black bodies r and r' represent the two sections of the slit m which are normally covered or protected by the
 70 opaque portions s and s' . But when the key K is operated to move the shutter to the right it uncovers the section r , and vice versa, thus producing the pattern precisely as already described, only it is now done
 75 manually instead of automatically. By arranging the shutter like Figs. 5 and 32, to be moved in both directions from the center and to different distances for the different letters or signals, a strip like Fig. 17 would
 80 be made. Fig. 32 shows the key or lever K for moving the shutter, the proper distances being indicated by the scale y^2 . The springs y y keep it normally in its central position and when moved to either side it uncovers
 85 one of the sections of the slit m precisely as described for Fig. 31 and the farther the key is turned on its central pivot the more of the slits or openings are uncovered by the shutter and the greater the length of the
 90 beam of light allowed to pass through to the sensitive surfaces behind the slit. Or the pattern strip could be punched out or otherwise produced by hand in the manner now practised for automatic telegraphing. Such a strip prepared in either way can then
 95 be run through my instrument at almost unlimited speed and the signals will be perfectly produced by the light being varied during its passage through the strip and then falling on two selenium bars or strips
 100 or other current-controlling devices arranged behind the slit m , producing correspondingly varying currents, which are then sent over the line or other currents induced by them sent instead to another phonograph
 105 or to one of my telephones or other apparatus, as shown at E in Fig. 33, where P is the pattern or strip moving past the slit m in the partition, S , and r and r' represent the two sections of the slit with the sectional
 110 current-controlling device arranged behind it—each section, when lighted, sending a current of opposite polarity through the circuit. When the speed is so great that the sounds or signals are unintelligible to the
 115 eye or ear at the receiving station they may first be recorded by one of my phonographs and the negative so prepared be then run through another phonograph, (or telephone), at the ordinary speed. In this way,
 120 the line wire can be utilized to its utmost capacity in speed for conveying the messages which may require a number of instruments to afterward speak or deliver them in the usual manner. Several currents may be
 125 conducted through the seleniums and so manipulated and transmitted simultaneously to different points.

Fig. 18 represents the arrangement for transmitting signals by said strips with a single long slit *m* in the phonograph except that the strip or negative P is fed past the slit *m* transversely instead of lengthwise of it as it would appear to be in the drawing. *m* is the narrow slit long enough to cover the length of the two selenium bars *p* and *p'*, each being inclosed and protected from all light except that which passes through the slit and the negative strip P. Each bar has proper wires to conduct the current through it which are so connected up that each bar directs the current which flows in it through the line in an opposite direction, and their resistances are such that no current (or a very slight one) flows through either of them as long as they are kept in the dark. But immediately that the negative strip admits light to either bar, its resistance is lessened and the current flows through that bar to the line or to the primary coil of an inductorium which sends the induced current to line or to any other device as the case may be—the strength of the current being in proportion to the length of the bar, thereby exposed to the light. The electrical connections are, as more fully shown in Fig. 33, or they may be arranged in any other suitable or well-known manner. The longer the transparent part of the strip or signal, the more of the bar is lighted up, and the stronger the current which flows through it. When the other bar is illuminated the same effect is produced but the current is sent through the line or circuit in the opposite direction—all of which will be readily comprehended and effected by electricians. My method and apparatus for producing pattern strips and converting the forms or signals into corresponding variations in electric currents are, therefore, peculiarly adapted for automatic telegraphy as well as automatic telephony—*i. e.*, transmitting telephonic messages by means of such records instead of by the original sounds—which latter, I believe, is something hitherto unknown.

When similar signals are recorded on the negative by means of a shutter like the upper one in Fig. 5, they will appear on the opaque strip, as shown in Fig. 19. These strips, as well as those before described, can be read by passing them along under a properly marked scale, the direction and different distances from the central line indicating the different letters. If this strip is fed through the phonograph at the proper speed the signals will be transmitted as above described and received in the same way by my telephone or any other suitable instrument. It should be understood that my "telephone" is an instrument capable of use for every variety of telegraphing as well as telephoning and for many other purposes. Signals

consisting of ciphers or arbitrary characters of any kind which may be unknown to any but the sender can be similarly recorded on the negative and transmitted by the phonograph to destination where they can be correctly received and printed either by my telephone or phonograph. And it will be observed that the most secret or complicated signals can be thus sent and received without the possibility of a mistake during transmission for the reason that the operators have nothing to do with the transmission except to keep the mechanism in order—the whole of the work being done automatically by the phonograph.

By having several operators sound their messages into the diaphragm *d* of the phonograph at once, but each in a different tone, the whole of them will be recorded on the negative in one composite sound wave or curve, which will then be transmitted by the phonograph as one message over the line.

As my phonograph can convert all kinds of sounds into currents as strong as are used in any of the ordinary systems of signal telegraphing, it will transmit speech as far and as certainly as the usual signals are sent and much farther than has before been practicable. And as my "telephone" can operate with currents of such strength as would be totally unsuited for the ordinary telephones and microphones, it can be connected in the circuit or at the end of the line from the phonograph in any well-known or suitable way and the combined apparatus can then transmit, relay, and send on sounds in the same way as is now done in signaling, and they can be so repeated and sent on as often and as far as ordinary telegraphic signals can be—which also is a result never before accomplished, so far as I am aware. Fig. 34 illustrates one way of embodying this arrangement. The current, after being manipulated by the pattern P and the controlling device *p* flows through the primary wire of the induction coil I, whose secondary wire sends a current to line. But the original current from *p* may, of course, be sent over the line. *El El* represent my telephonic apparatus used for the translating or repeating telephonic and phonographic messages or currents till the final stage, where they are reproduced as sound by the telephone T or otherwise utilized. Batteries may be inserted in the different stages, if desired. In short, by the use of my "phonograph" in connection with my "telephone" I not only raise telephony to the same level with other branches of telegraphing but I make a great advance in the whole art of telegraphing. But that is not all that they can do. By suitably attaching the expansion wires of my telephone to the diaphragm *d* of the phonograph instead of to its own diaphragm *d*, my phonograph will

make negatives of the sounds or signals transmitted to it over the line in connection with the telephone. This arrangement is shown in Fig. 21 (also in Fig. 37). The telephone is designated by *El*, the base of which slides in the cleats *t t* to the position shown by the dotted lines at its ends. *c c* are the suspension wires running to the cross piece *u* which is attached to the diaphragm *d* which is carried by the base of the telephone and, consequently, moves with the binding posts at the other ends of the wires *c c* when the diaphragm and shutter are to be moved back out of the way—thus avoiding any disarrangement of the telephonic adjustments thereby. *g* is the armature carried by the wires with its shutter, *l'* is the light and *r²* is the current-controlling device belonging to the telephone. *T* is the telephone, telegraphic instrument, or other apparatus which transmits sounds, electrical impulses, or signals from a distance to the telephonic devices *El* by means of which those influences are enabled to actuate the phonograph and produce records or "patterns" thereof as already described. The same apparatus *El* can, of course, be employed for transmitting messages, etc., as well as for receiving them. The phonograph can, therefore, remain in the office and the speech, music, or signals be transmitted to it by telephone for record and preservation. All messages, either received or transmitted, whether in sounds or signals, can be thus recorded and the record be either preserved or used for repeating the messages without a possibility of error in so doing. Such a record will be as positive proof of the exact tenor of the message sent or received in any court as a photograph recording any event or scene.

A last will or testament, or a dying man's deposition, or statements, may be perfectly recorded and when needed for evidence, they can be reproduced exactly as originally spoken, and then by using a stronger light or current can be repeated as loudly as desired without altering a single tone or modulation of the words. By using a sensitive diaphragm or telephone in connection with a strong light sounds ordinarily inaudible may be clearly recorded and reproduced identical in every respect except that of being louder and this strengthening of the sounds may be carried to any extent desired, as hereinbefore fully explained.

When the phonograph is driven by an artificial motor, it is arranged with a catch or stop piece which is lifted out when any sound is to be recorded and dropped again to stop the motor and strip when done, as shown in Figs. 35 and 36, where the belt *B* conveys motive force to the phonograph from any suitable driving mechanism or motor turning a pulley on the shaft of the

roller *A'*, which draws the negative strip *P* down over the rollers *R R*, as previously explained. On the same shaft as *A'* and moving with it is the notched wheel *v*; and *L* is a latch which is drawn down by the spring *y* and catches in the stop-wheel *v* except when prevented. As long as *L* is held up the negative strip *P* will be fed onto the roller *A'* by the action of the belt *B*; but when *L* drops, a pawl upon it catches into the stop wheel *v* and arrests the mechanism. The latch may be raised and dropped manually or automatically. The figures show an arrangement which may operate both ways. In Fig. 35 an electromagnet *M'* is arranged to lift the latch *L* whenever a current is sent through it and is in the circuit of a suitable battery and a selenium cell *p²* arranged at the edge of the slit *m* and so placed that it is normally protected from the light by the shutter *s*. But when the shutter vibrates, it exposes *p²* to the light from *l*; the current then flows through the circuit; and the magnet *M'* lifts the latch *L*, liberating the driving mechanism which thereupon feeds the negative strip past the slit *m* until the sound or other influence ceases. The latch *L* is then dropped by the shutter ceasing to vibrate and thereby shutting the light from *p²* and stopping the current through the magnet. In Fig. 36 is the arrangement which may be employed when the telephone *El* is connected with the phonograph. When a sound current or signal is transmitted the armature *g* vibrates and a light lever *g'* attached to it will lift the latch *L* and keep it out of the notches as long as the armature *g* continues to vibrate. Either of these arrangements may be used whereby this sound itself will release the motor and so feed the negative along as long as the sound continues, and stop it when the sound ceases. Such arrangements are in use for other purposes and any suitable one may be employed in connection with my phonograph. With this arrangement the phonograph can be used for many purposes otherwise impracticable. It can even be set up in any room or place and left by itself and will record whatever sounds or messages there are as long as the negative or motor continues unexhausted. This is also a useful arrangement for telegraphing purposes, as it continues to act while dispensing for a time with the presence of the operator.

When the expansion wires of the telephone are connected with the diaphragm *d* of the phonograph, as before referred to, the negative can record not only sounds but variations in the direction and strength of electric currents or in the attractive power of magnets or changes of temperature. It will also record the comparative strength of two different electric currents, showing precisely when either one became the stronger,

which, and how much so. It will record changes in the intensity of light and in fine, it will record all the phenomena which the "telephone" is capable of being affected by.

5 In turn, it can reproduce the actions of the telephone caused by those phenomena or the phenomena themselves, not only in their original strength, but amplified or strengthened without otherwise changing them.

10 For some purposes, it may be advisable, while making the negative, to substitute that with its slit m for the selenium devices of the telephone and record the variations of the light as they are produced, as shown at

15 P in Fig. 37. For instance, the negative could be substituted in place of the cell r^2 in Fig. 21, and record the variations of the light l' produced by the vibrations of the armature g with its shutter. This arrange-

20 ment is more fully shown in Fig. 37, where the strip P is seen arranged behind the slit m and exposed to the light from l' , which is varied by the shutter s' . This will ordinarily be the best way for strengthening

25 light pulsations. As the vibrations of the shutter on the armature g are much more ample than those of the shutter on the diaphragm d under the action of the same sound, current or other influence. One way

30 of doing this is illustrated in Fig. 37, where the light from l varied by the shutter on d is thrown on the selenium cell p , and the current thus produced is let through the thermal wires $c c$ of the telephone, causing

35 a considerable increase in the vibration of the armature g with its shutter s' . This produces more marked variations in the light from l' which, thus strengthened or amplified, are then recorded on the negative

40 strip P.

There are very many other uses for which my apparatus may be employed, but it is unnecessary to enumerate them, as the directions herein given will enable those versed

45 in photography, electricity, and acoustics, to practise any of them.

It will, of course, be understood that I do not confine myself to the precise details of the construction or arrangement of my apparatus as herein set forth, for there are

50 many ways in which they may be modified without changing or departing from the principles of my invention. I am aware that it is not new to produce photographic

55 impressions of telegraphic messages arriving over a line, such impressions not being capable of reproducing said messages again. Such a process is merely one way of printing the telegraphic messages received, but

60 such prints are of no value for the purposes of my process because they are not capable of use in the process as "patterns." My invention or process has not for one of its objects to merely print the telegraphic mes-

65 sages received, but the production by means

of electrical impulses of "patterns" or devices which are adapted to reproduce such impulses whenever desired. I, therefore, do not claim a process for printing telegraphic messages by photography, which has for its

70 object and result the production of prints that have no function, use, or value, except as copies of the messages received and so printed as aforesaid.

Fig. 38 shows the general arrangement of the apparatus in more detail than Fig. 10. When in use the works are shut in by tight

75 doors, as in Fig. 45, where O is the mouth piece through which vocal or other sounds are thrown on the diaphragm D. This mouth piece may be a deep bell-shaped

80 cavity directly over the diaphragm or be fitted to the face and be connected by a tube ending over the diaphragm. The effect is much increased by having the mouth piece

85 fit closely to the face of the speaker. El represents an electrical apparatus capable of vibrating the diaphragm D when a telephonic, telegraphic or other suitable current is passed through it and thereby vi-

90 brating the shutter s placed in the path of the beam of radiant rays from l here shown as an electric lamp, and thus varying said beam in accordance with the extent and

95 character of its own movements. The beam thus varied is in the first instance thrown upon the sensitized strip P fed down from reel A over guide roller R before the opening or slit m on to another reel A'.

100 The strip having been properly treated to bring out and fix the image thus obtained and render it suitable for use as a pattern, as before described, it is again wound upon reel A

105 and its end hooked to reel A'. The apparatus El is moved back far enough to take shutter s out of the beam of radiant rays which then pass through the negative and

110 are varied thereby as they had been previously varied by the shutter s , after which they fall upon a selenium cell or other suitable apparatus p' , all as heretofore explained.

Fig. 39 is a horizontal section through the lines $x-x$ of Fig. 38, showing the light and lenses l , alum cell 2, shutter s , cylindrical

115 lens p which converges the light laterally to a long narrow streak where it passes through the opening m to strip P. The set-screws $t' t'$ adjust the forward position of the block t^2 on apparatus El to bring the shutter s

120 to the right point. p^2 is a small selenium cell which serves to automatically start off the strip P when the phenomenon occurs which is to be recorded. The shutter s is

125 caused to vibrate, as already stated, and thereby uncovers the cell p^2 , allowing the light which had previously been stopped by the shutter to fall upon the cell and by increasing its conductivity an electric impulse

130 is sent through the starting magnet M'.

This immediately pulls up the armature and lever L and raises the pawl which had previously held the reel A', whereupon the reel is suddenly revolved and draws the strip P past opening *m* until the sound or other phenomena ceases, when the shutter becomes still, the current substantially ceases to flow through the cell *p*² and magnet M', the lever L drops and the reel A' is stopped. When reproducing the recorded phenomena the lever L is lifted manually by a cord *a* running over a pulley through an aperture to the outside at some accessible point, where it can be pulled when desired. The current of the cell *p*² can also be sent through induction coil I and transmit the message if desired to a telephone T at the same time that it is being recorded on P.

The shutter may be attached directly to the center of the diaphragm, or at the end of a light lever, as in Figs. 38 and 44, pivoted in a bar or support *b*. The diaphragm being connected to the short arm of the lever a greatly increased motion of the shutter is obtained.

Fig. 40 is a more complete view of the arrangement heretofore shown in Figs. 14, 15, 21, 22, 23 and 34. The slide S, Fig. 38, having a single slit *m*, is removed and its place is put slide S², having three slits, as in Fig. 42. The slide S is represented by slide S' in Fig. 41, having a base 16, upon which slides another piece 17, carrying the plano-cylindrical lens *p* adjustable to bring its focus at or near the opening *m*. Slide S² has three slits adjustable upon it, as in Fig. 23, with three cylindrical lenses *p* attached to an arc 18 upon which they may be adjusted laterally to bring their foci in or near *m*, *m'*, *m*², and the whole series are adjustable on the slide 17, as before described. The light from each lens goes to its own selenium cell *p'*, which are adjustable in position in the manner already set forth on a base plate 16, Fig. 43, which is screwed in place in the apparatus, and each cell has its electrical connections suitably arranged, as fully hereinbefore specified so that further explanation of Fig. 40 is needless except that when the single cell *p'*, Fig. 38, is to be used the middle cell *p'*, Fig. 43, is simply swung out of the way by turning it down on its screw, which allows the light to pass properly.

Fig. 44 shows the connection of apparatus EL with its shutter *s*, diaphragm D, armature *g*, magnet G, and wires *c* to the body and base of the main apparatus *t t* being the ways by which EL slides back and forth as before stated.

Fig. 46 shows the mode of connecting up for recording the incoming message (or the like) at P and at the same time listening to it or receiving it at T by any telephone, telegraphic, or other suitable apparatus and also

repeating or transmitting it further on to another station or apparatus EL and another T. This is done by means of the selenium cell *p*³ which is more or less exposed to light by the motion of the armature *g* of EL, as it is vibrated by the current flowing through the magnet G. This may be done either by the shutter attached to the armature and cutting off more or less of the light thrown across it to the cell or by a mirror which reflects more or less of its light upon *p*³ according to its vibration. Both are shown in the model having their own selenium cells. The current of one of these can be sent through the magnet G to reinforce a line current coming in at the binding posts at L while the current of the other cell *p*³ can be sent farther on as before stated or can be sent to the induction coil I, whose secondary current is transmitted on as delineated in the drawing. Fig. 47 shows the current of this selenium cell employed to operate a starting magnet M' in place of the cell *p*² in Fig. 38. When the lever L is lifted it hits a contact point above and completes the circuit L³ through the lever. This current runs to a small electric motor EM, Figs. 38 and 48, which by a belt B working on pulley R' revolves the reel A' and feeds the strip or pattern P. A crank handle is provided for manually turning the pulley R', winding a cord and lifting a weight (or winding a spring) for running the reel when an electro-motor can not conveniently be used. When using the latter the arbor for the cord is disconnected by unscrewing the set-screw which holds it on the shaft.

Fig. 48 shows the arrangement for running reel A'. 9 is a steel shaft running in bearings as U U. When the pulley R' is turned to lift the weight, the pawl *z* catches in the ratchet wheel *w'* and holds the winding as usual. The pawl *z* is fastened to another ratchet wheel *w*, whose teeth face in the opposite direction to those of *w'*, and which are held by a pawl *z'* fastened to any stationary support shown in the drawing, as the back of the box or apparatus.

The disk *v* seen in Figs. 35, 38 and 47 is connected to wheels *w* by springs shown as held between posts projecting from the adjacent faces of *v* and *w* respectively. Any convenient number of springs may be so applied as to give the desired strength. When the lever L with its pawl suddenly stops the motion of disk *v*, the weight continues to pull the wheel *w* around until the springs between it and *v* bring *w* to a standstill. *w* being prevented from receding any by the pawl *z'*, the springs remain under tension (or compression, as the case may be) until the lever L is lifted again out of the notch of *v*, which is thereupon suddenly forced forward by the recoil of the springs. This secures that the reel A' and

strip P shall have a rapid motion given to them at the outset instead of beginning slowly and gradually acquiring the proper speed as would occur without this device.

5 The reel A' fits upon a square formed on the sleeve 10 and, therefore, moves with it. The strip P wound around the reel is protected from the light by the light-tight case or box 11, having a cover 12 held on by
10 springs 13. This box turns loosely on the reel and takes any position agreeable to the strip P while feeding off it through an opening through its side, as seen in Fig. 50. 14 is a catch to hold the reel upon the sleeve
15 10, but allowing it to be readily removed when desired.

Substantially the same description applies to the reel A in Figs. 49 and 51. 14 is a snap spring to hold it on sleeve 10, which is
20 held on shaft 9 in any convenient way shown as by a pin through 9. The spring 1 bearing on a collar of 10 acts as a friction brake on reel A. Shaft 9 is fixed in any convenient way, shown as bolted to the box or case of
25 the apparatus.

It will be observed that by this invention a recording medium is transmitted to the surface adapted to receive the record and that this medium is merely controlled by
30 the speaking diaphragm as it passes to the surface and thus the diaphragm is not called upon to do the physical work of making the record. The light projected on the surface makes the record and is simply controlled in
35 character or position as it passes.

Having thus fully described my invention what I now claim as new and desire to secure by Letters Patent is:

1. In the within described system, the device or combination of elements for recording
40 and reproducing pulsations or variations in radiant energy, consisting in the combination of a suitable surface having those variations consecutively recorded upon
45 it and adapted for producing similar variations in a beam of light; an electric receiver sensitive to light having such varying beam of light thrown upon it and thereby producing similar variations in an electric current having any desired strength; and an
50 electrical receiver actuated by said current and producing similar variations in radiant energy.

2. In the within system, a device or combination for amplifying or enlarging the
55 effective action of sound wave in the direction of its width of intensity without changing its proportional length, consisting in the combination of a source of light; means
60 operated by and in accordance with sound waves for varying the light; and a uniformly moving sensitive surface; the speed of said surface and the relative distances between said three elements being variable
65 to suit the requirements of the case.

3. In the within system, a device or combination for reinforcing the sounds produced in the original or central sound-producing instrument, at such stages or distances as the sounds can be heard plainly,
70 consisting in the combination of the central sound-producing instrument; suitable secondary sound-producing apparatus at each such stage; electrical connections from each apparatus to the original instrument; apparatus producing currents similarly varied
75 and sent to each secondary apparatus; and means for so adjusting the transmission of the several currents that the like variations occur at such intervals one after the other, as correspond to the time required for the
80 sounds to pass from each station to the next one in order.

4. In the within system including a reproducing instrument, a device or combination
85 for automatically regulating and controlling an electrical current flowing through the reproducing instrument, consisting in a suitable electric generator, a conductor whose resistance can be varied by means of the
90 record or pattern included in the circuit of the instrument; a source of radiant energy capable of affecting the resistance of said conductor; a pattern having upon it curves or forms representing the pulsations or
95 variations it is desired to make in the current arranged to properly control said radiant energy; and means for moving the pattern at such speed as will produce the desired variations in the resistance of said
100 variable conductor and, consequently, in the current flowing through it and through the circuit.

5. In the within system, a device or combination for automatically varying the
105 intensity and direction of a current flowing through a circuit, consisting in said circuit having two branches; an electrical conductor in each branch whose resistance is varied by light; electrical connections between
110 them and said circuit such that the current that flows through one will be in the opposite direction to that which flows through the other, and each will have a strength proportionate to the resistance in its circuit at
115 each instant; means for supplying a suitable beam of light for said conductors; means for properly varying said beam of light while falling on said conductors, and thereby so varying their resistances as to
120 allow the current to predominate and have the strength in either of them, as may be desired.

6. In the within system, a device or combination including a pattern for producing
125 in an electrical current pulsations or variations corresponding to those formed on the record or pattern, consisting in a source of radiant energy arranged to throw a steady beam of its rays upon a conductor whose

electrical resistance is varied by the action of said rays; said record or pattern interposed in the path of said beam and arranged to be moved uniformly before said beam
 5 and to vary the amount of said rays which shall reach said conductor in accordance with the forms or curves exposed to said beam; a suitable perforated screen limiting said beam to a cross-section whose length
 10 is equal to the maximum width of said pattern or record, and whose lateral width is very small, so as to expose but a minute portion of the length of said record or pattern to said rays at any particular instant; a
 15 suitable electrical circuit containing said variable conductor so that variations in its resistance produce similar variations in the current flowing through said circuit; means for moving said record or pattern at the
 20 proper speed whereby it varies the length of said beam which shall reach said variable conductor in proportion to the width of said record or pattern which is exposed to said beam at each successive instant and thereby
 25 correspondingly varies the resistance of said conductor and the strength of the current flowing through it.

7. In the within system, a combination or device which, in the process of forming a
 30 record of pulsations in or variations in light, sound, electric currents, and magnetism, amplifies the record in width without changing the length or duration of the waves, consisting of a source of light and a shutter constituting means for recording said varia-
 35 tions; and means for varying the position of the light with respect to the shutter for producing a leverage or multiplication of the movement which corresponds to the intensity of said variations; whereby a corre-
 40 spondingly increased width or surface of the sensitive material is acted upon in making the record and a suitable sensitive surface adapted for forming said record.

45 8. In the within system, the combination of a device for reproducing the variations or pulsations in sound, light, electric currents, or magnetism, recorded on the pattern; said pattern, suitable reproducing apparatus; ap-
 50 paratus producing a suitable active agent for governing the action of the reproducing apparatus according to the intensity thereof acting upon it; said pattern arranged to vary the intensity of said active agent ac-
 55 cording to the form of the portion exposed to it; means for uniformly moving said record or pattern along at the proper speed and successively exposing the different portions to said active agent; whereby the in-
 60 tensity of said active agent is varied in proportion to the width of the wave at each instant of time exposed to it; thereby properly varying the action of the reproducing apparatus.

65 9. In the within system, a combination or

device for recording variations or pulsations in radiant energy consisting of a screen provided with a narrow slit or opening through which a beam may pass, apparatus furnishing said suitable beam of light, a sensitive
 70 surface arranged to receive said beam, means for moving said surface along before said slit; a light-varying device interposed in the path of said beam, actuated by the radiant energy which is to be recorded, in accordance
 75 with the pulsations or variations therein, and arranged to vibrate in the proper direction as described relatively to the motion of the sensitive surface; whereby an image or record is produced on said surface having
 80 variations corresponding to the variations of intensity and duration in the phenomenon being recorded and capable of reproducing said phenomenon.

10. In the within system, a combination or
 85 device for reproducing sound, in a different tone, note, or pitch, consisting of a photographically-obtained negative or record of said sound; suitable sound-producing apparatus controlled by said record; and means
 90 for moving said record more rapidly or less rapidly than while the record was being produced according as the pitch is to be higher or lower than that of the original sound.

11. The combination of a source of light, a uniformly moving surface sensitive to light; and a shutter moved by or in accordance with sound waves or pulsations and arranged and operating to admit said light to
 100 or cut it off from said surface in accordance with said sound pulsations or variations and thereby produce a record capable of reproducing said sound waves or pulsations, substantially as described.

12. The combination of a source of light adapted to cast a beam; a diaphragm adapted to be vibrated by or in accordance with variations or pulsations in radiant energy, a shutter moved by the diaphragm in its vi-
 110 brations and arranged to interrupt or modify the said beam of light in accordance therewith; a surface sensitive to light and means for moving said surface along under exposure to said varying light beam to form a
 115 record capable of reproducing said pulsations or variations.

13. The combination of photographically produced negative or pattern having upon it forms or curves representing variations or
 120 pulsations in sound, light, or electric currents and arranged to vary the resistance of an electrical conductor in accordance with the curves or forms upon it; an electrical conductor adapted for being so acted upon
 125 and controlled by the pattern; and suitable driving mechanism for properly moving the pattern along.

14. The combination of a source of light furnishing an elongated beam; means for
 130

varying the amount transmitted by said beam in accordance with the pulsations or variations in the sound, light, electric current, or magnetic attraction which are to be recorded; a surface sensitive to light; and mechanism for moving said surface along in the path of said beam to form a record capable of reproducing said pulsations or variations.

15. The combination of a source of light furnishing an elongated beam; a pattern having variations in light recorded thereon such as herein described arranged to vary said beam in accordance with the variations in said pattern; mechanism for moving said pattern in the path of said beam; and an electrical conductor whose resistance is varied by light, arranged to receive said varying beam of light and to correspondingly vary an electric current flowing through it.

16. The combination of a source of light adapted to furnish an elongated beam; a pattern having forms thereon corresponding to variations in light movable across the path of said beam and arranged to vary said beam in accordance with the variations in the forms upon it; means for moving said pattern and an electrical conductor sensitive to light exposed to said varying beam.

17. The combination of a source of light furnishing a steady beam of light; a moving pattern accurately representing sound waves arranged to vary said beam in accordance with the forms upon it; and translating devices actuated by and in accordance with said varying beam of light.

18. In apparatus for recording and reproducing sound through the medium of light, a movable record blank sensitive to light, means for projecting light varied in accordance with the pulsations or variations in sound upon said blank to form a record, means for rendering said record translucent in degrees corresponding to said pulsations or variations, means for reproducing sound and means for projecting light through the record thus produced to reproduce the sound.

19. The combination of a source of radiant energy; means for properly directing the rays therefrom; a moving pattern in the path of said rays having upon it curves or forms representing variations or pulsations in sounds, light, or electrical currents and constructed and arranged to properly vary the said rays; a stationary screen or device having one or more apertures or slits in it for stopping all of the said rays except those which pass through said slit or slits; an electrical conductor whose resistance is varied by said radiant energy, arranged to be acted upon by the rays passing through said slit or slits after being varied by the pattern; and an electrical receiver actuated

or controlled by the currents flowing through said conductor; substantially as set forth.

20. The combination of a source of light; a moving pattern or form representing variations or pulsations in sound, electric currents, or magnetic attraction; a slitted screen or partition for directing said light upon said pattern; a body sensitive to light exposed to said varying beam and a suitable camera or casing inclosing the whole.

21. The combination of a source of radiant energy, means for directing rays therefrom; a photographically-produced pattern for properly interrupting or acting upon said rays in accordance with the photographed curves upon it; and a suitable device or body sensitive to the action of said radiant force constructed in elongated form and adapted to be acted upon more or less energetically in proportion to the length of it which is exposed thereto by the interrupting device, substantially as set forth.

22. The combination of a source of radiant energy, a body sensitive to the action of said radiant energy, constructed in an elongated form and adapted to be acted upon more or less energetically according to the length of it which is exposed to said radiant force; a movable device consisting of a record due to the action of sound waves arranged between them and adapted to vary the action of the radiant force upon the sensitive body by varying the length of said body which is exposed thereto; and means for properly moving said movable device in accordance with the variations or pulsations of sound, substantially as set forth.

23. The combination of a source of radiant energy; means for directing the rays therefrom; a moving pattern in the path of said rays and adapted for properly manipulating the same, the said pattern consisting of a record in properly timed sequence of changing phenomena; a stationary screen or partition having two or more apertures or slits through it for allowing the passage of rays manipulated by different portions of the pattern at the same time; and suitable stationary devices sensitive to said radiant energy arranged opposite the openings or slits and adapted to be successively acted upon by rays manipulated by a given portion of the pattern and coming through the different slits one after the other as the said portion of the pattern moves past the successive slits.

24. The combination of a source of light; a pattern moved uniformly in the path of said light, the said pattern consisting of a record in properly timed sequence of changing phenomena; a stationary screen provided with a series of slits or openings for taking light from a given portion of the illuminated pattern at different times, and

means for adjusting the intervals of time between them by varying the distances between the respective slits.

25. The combination of a source of radiant energy and an electric circuit; a conductor in such circuit capable of being affected by said radiant energy to vary its resistance; and a photographically produced negative or pattern having upon it a record adapted to vary the radiant energy reaching said conductor for producing corresponding changes in the resistance of said conductor; for automatically regulating, controlling and varying the current flowing through the conductor according to the forms on the pattern.

26. The combination of a source of radiant energy and an electric circuit; an electrical conducting device in said circuit adapted to send through the circuit a current which varies in intensity and polarity in accordance with the variations in the curves or forms upon the pattern which controls its action; a photographically produced negative or pattern having upon it forms or curves representing sound waves or electrical impulses automatically recorded by the sounds or impulses themselves and adapted for reproducing the same again, the said pattern being moved between said source of radiant energy and conducting device to control the energy reaching the conducting device to cause it to send through the circuit an undulating or alternating current corresponding to the curves or forms upon the pattern and, consequently, corresponding to the variations or pulsations in the phenomena recorded upon the pattern, substantially as set forth.

27. In an apparatus for recording and reproducing sounds, electrical impulses and analogous phenomena, a stationary opaque partition or screen, having two or more openings or slits, and arranged to stop all of the radiant rays except those which pass through said slits, provided with means for varying the relative distances of the said openings or slits from each other, and apparatus for properly directing a beam of light through each of said openings at the same time, a record or pattern in properly timed sequence of said phenomena moving before said openings, and a separate means before each of said openings or slits for utilizing said phenomena, all combined and operating substantially as set forth.

28. In the within system, a combination or device for recording sounds, electrical impulses and analogous phenomena, consisting of suitable recording apparatus actuated by the phenomena themselves, and arranged to automatically record them upon a sensitive surface; said sensitive surface; an elongated photographically obtained image or form so thrown upon said surface in which

the width of said image shall correspond to the varying intensity of the pulsations or variations in said phenomena and the form of the curved outlines thereof shall correspond to the character and direction of said variations or pulsations at each instant of time; the sensitive surface when acted upon by said image being afterward treated to impart to it actinic or other properties different from the remainder of the surface, whereby it is adapted for reproducing the phenomena so recorded thereby.

29. In the within system, a device or combination for recording sounds, electrical impulses and analogous phenomena, consisting of suitable devices and means controlled by the phenomenon which is to be recorded and producing upon a sensitive surface a characteristic change, which renders the part so acted upon different from the rest of said surface and which corresponds in intensity, extent, or character with the intensity and character of the phenomenon or influence which produced the same; said sensitive surface; means for confining or limiting the said action of said phenomena to a definite area or section of said sensitive surface, which area may be of any suitable length, but of comparatively very limited breadth; means for moving said surface uniformly along in the direction of the breadth of said section of its surface and thereby bringing different portions of said sensitive surface successively under the influence of said phenomenon in the form of a strip having a width equal to the length of said section and of any convenient length; said surface being afterward treated, thereby producing upon the negative or pattern an image or form corresponding to the variations or pulsations of the phenomenon which produced it, and characterized by photographic properties, which adapt it for reproducing the same or similar pulsations or variations in light, sound, electrical currents and analogous phenomena, substantially as herein set forth.

30. In apparatus for recording and reproducing sound through the medium of light, a movable record blank sensitive to light, means for projecting light varied in accordance with pulsations or variations in sound upon said blank to form a record and means for utilizing the record thus produced to reproduce the sound.

31. In the within system a source of light arranged to cast a beam, a record blank sensitive to light, means for moving said blank along in the path of said beam, means controlled by sound waves or pulsations to vary the amount of said beam admitted to said blank to form a record capable of reproducing the sound, and means for relatively arranging said elements to intensify the recording effect.

32. In an apparatus for reproducing sound, a record having photographically produced thereon forms representing the pulsations or variations it is desired to reproduce, a circuit including a reproducer and a conductor whose resistance may be varied by light, means for moving said record along in proximity to said conductor, and means for projecting light through said record upon said conductor.

33. A record of pulsations in sound consisting of a thin sheet rendered translucent in degrees corresponding to said pulsations photographically-produced thereon and capable of reproducing the sound.

34. A record of pulsations in sound consisting of a strip or band photographically affected in accordance with said pulsations and capable of reproducing the sound.

35. In apparatus for recording and reproducing pulsations or variations in sound, a source of radiant energy, a movable record blank in proximity thereto sensitive to and capable of being affected by said energy for receiving and retaining a record of said energy, means for moving said record blank along, means for varying the amount of said energy admitted to said blank and thereby producing a characteristic change in said blank in accordance with said pulsations or variations to form a record and means for utilizing said record to reproduce the sound.

36. In apparatus for recording and reproducing pulsations or variations in sound, a movable strip or band sensitive to radiant energy, means for forming thereon a record of said pulsations or variations by the direct action of said radiant energy, reproducing means capable of being affected in accordance with said record and reproducing the sound, and means for moving said strip or band along in operative relation to said reproducing means.

37. The combination with a source of radiant energy, of a movable record blank operatively related thereto capable of being affected by said radiant energy, means for moving said record blank and means for varying the amount of said energy supplied to said record blank in accordance with pulsations or variations in sound to produce a characteristic change in said record blank and thereby form a record capable of reproducing the sound.

38. In apparatus for reproducing sound, a record having photographically produced thereon a representation of the pulsations or variations it is desired to reproduce, a circuit including a source of current, a telephone and a selenium cell, means for suitably moving said record in operative proximity to said selenium cell and means for projecting light through said record upon said cell.

39. The combination of a translucent pho-

tographically produced record of succeeding variations in radiant energy, a circuit including a source of current, a reproducer, and a selenium cell, means for suitably moving said record and means for projecting light through said record upon said selenium cell.

40. In instruments of the class described, in combination, a photo-electric cell included in a telephone-circuit, a moving photographic sound-record, and means for passing light through said record to the cell, substantially as set forth.

41. The method of recording and reproducing sounds consisting in forming a photographic record of the sounds by directing actinic rays emanating from a source thereof upon a photo-sensitive surface and varying the said rays reaching said surface by and in accordance with the sound waves, then developing the photo-sensitive surface, then interposing the sound record so produced in the path of a constant beam of light, setting up in an electric circuit electric variations by and in accordance with the variations of the transmitted light-beam, and producing by said electric variations air vibrations corresponding to the original sound.

42. The method of recording sounds consisting in forming a photographic record of the sounds by directing actinic rays emanating from a source thereof upon a photo-sensitive surface and varying the amount of said emanations by and in accordance with the sound waves.

43. The method of recording sounds consisting in setting up in a charged electric circuit variations corresponding to the sound waves, controlling actinic radiations by and in accordance with said electric variations, and directing said actinic radiations upon a photo-sensitive surface.

44. In a device of the class described the combination with a photo-sensitive surface and a source of actinic rays movable relative one to the other, and means for controlling the said rays reaching said surface by and in accordance with sound waves.

45. In a device of the class described the combination with a source of light rays, of a photo-sensitive surface, means for moving said surface across said light rays, and means for controlling the amount of said rays reaching said surface by and in accordance with sound waves.

46. In a device of the class described the combination with a source of light rays, of a photo-sensitive surface, means for moving said surface across said light rays, and means for controlling the width of the beam of rays transversely of the moving surface by and in accordance with sound waves whereby a record varying in width will be produced.

47. A sound record consisting of a record

blank photographically affected in accordance with sound pulsations and capable of reproducing the sound.

48. The method of producing phonographic records capable of reproducing sound consisting in first obtaining a photographic pattern or negative representing pulsations in sound and then producing commercial copies from said negative.

49. A pattern or negative having photographically recorded thereon pulsations in sound and capable of use as a master record in producing therefrom commercial copies capable of reproducing the original pulsations in sound.

50. The combination with an electric circuit, of means for telephonically transmitting sounds thereon, a movable receiving surface, means for recording thereon the transmitted sounds, and means for automatically moving said surface to receive the record, the said movement being controlled by the telephonic transmitting means.

51. The combination with an electric circuit, of means for telephonically transmitting sounds thereon, a distant movable receiving surface, means for moving said surface, means for recording on the moving surface the transmitted sounds, and means accessible at the transmitting point for controlling the movement of the receiving surface.

52. The combination with an electric circuit, of means for telephonically transmitting sounds thereon, a distant movable receiving surface, means tending to move said surface, a stop normally preventing movement of said surface, means accessible at the transmitting point for controlling said stop to permit the movement of said surface, and means for recording on the moving surface the transmitted sounds.

53. In a system of the class described the combination with an electric circuit, of means for transmitting to a distant point in said circuit telephonic messages, a second electric circuit at said distant point, means for receiving the sound pulsations in said first circuit at said distant point and for making a record thereof, and means operated by said record for impressing said pulsations on said second circuit whereby the message will be relayed, and means for reproducing as sound the relayed message.

54. The combination with an electric circuit, of a selenium cell therein, a movable sending blank having a record of visible forms thereon, means for transmitting a beam of light modified by said record to said selenium cell to modify the electric pulsations in said circuit, means for moving said record to bring successive portions thereof under the influence of said beam, a receiving blank, means for moving said receiving blank, and means controlled by the

pulsations in said circuit for reproducing on said receiving blank the record of visible forms on said sending blank.

55. The combination with an electric circuit, of a selenium cell therein, a record surface different portions of which affect light differently, means for directing a beam of light from one point on said surface to said selenium cell the said beam being modified by said record, means for moving said record surface to bring successive portions under the influence of said beam directed to said selenium cell whereby varying pulsations or undulations will be set up in said circuit, a receiving surface, means for moving said surface, and means controlled by the pulsations in said circuit for reproducing on said receiving surface the original record.

56. The combination with an electric circuit, of a selenium cell therein, a record of visible forms, means for transmitting a beam of light from one point on said record to said cell, means for exposing different portions of said record to said beam to produce varying pulsations or undulations in said circuit, a receiving surface, and means controlled by said pulsations for reproducing on said receiving surface said record of visible forms.

57. The combination with an electric circuit, of means therein which react to light, a sending surface having recorded thereon variations in light, means for transmitting a beam of light from one point on said record to said light reacting means, means for exposing different portions of said record to said beam to produce varying pulsations or undulations in said circuit, a receiving surface, and means controlled by said pulsations for reproducing on said receiving surface said record of variations in light.

58. The combination with an electric circuit, of means therein which react to light, a sending surface having recorded thereon variations in light, means for transmitting a beam of light from one point on said record to said light reacting means, means for exposing different portions of said record to said beam to produce varying pulsations or undulations in said circuit, a receiving surface, and means controlled by said pulsations for photographically reproducing on said receiving surface said record of variations in light.

59. The combination with means for transmitting electric pulsations, of means connected therewith which react to light, a surface having a record of visible forms thereon, means for transmitting light varied by said record to said light reacting means producing pulsations therein, a receiving surface, and means controlled by said pulsations for reproducing on said receiving surface said record of visible forms.

60. In a device for reproducing variations in light and sound the combination with a movable record, of a receiving surface, means operated by said record for projecting upon said receiving surface in rapid succession a series of photographic impressions, and separate means operated by said record for reproducing sound recorded in regular order thereon.

61. The combination with a record having thereon visible representations of variations in light in sequence, of a source of light, a receiving surface, means for moving said record and for exposing said visible representations to said light in regular order and for transmitting said light varied by said visible representations to said receiving surface, and separate means operated by said record for reproducing sound recorded thereon in regular order.

62. In a device of the class described the combination with a speaking diaphragm, of a movable photo-sensitive record blank, a source of light, and means controlled by said diaphragm for throwing a beam of light on said record blank.

63. In a device of the class described, the combination with a speaking diaphragm, of a movable photo-sensitive record blank, a source of light, and a reflecting surface controlled by said diaphragm for throwing a beam from said source of light on said record blank.

64. In a device of the class described, the combination with a speaking diaphragm, of a movable photo-sensitive record blank, a source of light, and a reflecting surface carried by and partaking of the movements of said diaphragm for throwing a beam from said source of light on said record blank.

65. In a device of the class described the combination with a speaking diaphragm, of a movable photo-sensitive record blank, means for concentrating a beam of light on said blank, and means operated by said diaphragm for controlling said beam of light.

66. In a device of the class described the combination with a speaking diaphragm, of a movable photo-sensitive record blank, a source of light, a reflector for directing rays from said source of light to said blank, and means operated by said diaphragm for controlling said beam.

67. In a device of the class described the combination with a speaking diaphragm, of a movable photo-sensitive record blank, means for directing a beam of light toward said blank, means operated by said diaphragm for controlling and modifying said beam, and a lens for concentrating said modified beam upon said blank.

68. The method of making sound records which consists in exposing a moving light sensitive record surface to a beam of light controlled in accordance with sound pulsa-

tions whereby a photographic line will be produced developing and fixing said line and treating said record to intensify said photographic effect.

69. The method of making sound producing records which consists in photographically recording sound pulsations on a surface and so treating said surface as to make the record more pronounced and permanent.

70. In a device of the class described the combination with a movable record having a succession of photographic impressions thereon, means for directing light rays to a point across which said photographic impressions pass and for projecting the rays modified by said record to a receiving surface, and means for reproducing said photographic impressions at a distance comprising an electric circuit including means which react to light exposed to rays modified by said photographic impressions on said record.

71. In a device of the class described the combination with a movable record having a succession of photographic impressions thereon, means for directing light rays to a point across which said photographic impressions pass and for projecting the rays modified by said record to a receiving surface, and means for reproducing said photographic impressions at a distance comprising an electric circuit including a selenium cell exposed to rays modified by said photographic impressions on said record.

72. In a device of the class described the combination with a movable record having a succession of photographic impressions thereon, an electric circuit having therein means which react to light, means for directing light rays from said photographic impressions to said light reacting means, and means controlled by the current in said circuit for reproducing said photographic impressions at a distance.

73. In a device of the class described the combination with a movable record having a succession of photographic impressions thereon, an electric circuit having therein a selenium cell, means for directing light rays from said photographic impressions to said selenium cell, and means controlled by the current in said circuit for reproducing said photographic impressions at a distance.

74. In an apparatus for transmitting vocal and other sounds, the combination with means for making a record of the sound vibration, of an electric circuit, means operated by said record for producing in said circuit similar electrical vibrations of greater rate, means for transforming said electrical vibrations into mechanical vibrations, means for recording said mechanical vibrations on a phonogram blank, and means for reproducing the original sound from said phonogram.

75. The combination with means for producing a record of sound waves, an electric circuit, means controlled by said record for transmitting electrical waves, impulses or undulations of current in said circuit corresponding to said sound waves in amplitude but having a different rate of vibration or pitch, and means for recording said waves at the receiving end of the circuit.

76. In an apparatus for reproducing sounds at a distance, the combination with means for making a record of sound, an electric circuit including a controller, means controlled by said record for operating said controller to set up electric waves or undulations of current corresponding in character to the sound waves but having a different period, means operated by said transmitted waves for producing a record of said waves, and means operated by said last mentioned record for producing audible sound.

77. The combination with a speaking diaphragm, of a movable record surface, and means for recording on said surface the movements of different parts of said diaphragm under the influence of sound pulsations.

78. The combination with a speaking diaphragm, of a movable record surface and a series of elements separately connected to and partaking of the movements of said diaphragm at different points across it for recording said movements on said record.

79. In instruments of the class described, in combination, means which react to light included in a telephone circuit, a movable visible sound-record, and means for passing light modified by and in accordance with said visible record to the said light reacting means substantially as set forth.

80. A photographically produced sound record capable of reproducing the sound recorded thereon.

81. A sound record consisting of a photographically produced pattern of sound characterized by a difference in elevation from adjacent portions of the record surface.

82. A record of sound made from a photographically produced record of sound and capable of reproducing the sound.

83. A sound record consisting of a photographically produced pattern of sound waves and capable of reproducing the sound.

84. The method of making a sound record which consists in photographically affecting a sensitive surface in accordance with sound waves.

85. The method of making a sound record which consists in photographically affecting a sensitive surface in accordance with sound waves and then producing by the use of said photographically produced record commercial sound records capable of reproducing the sound.

86. The method of producing commercial sound records which consists in photographically recording sound waves embossing said record and making commercial records capable of reproducing the sound from said embossed record as a master record.

87. The method of making sound producing records which consists in photographically recording sound pulsations on a surface and so treating said surface as to make the record more pronounced and permanent and then producing by the use of said photographically produced record commercial sound records capable of reproducing the sound.

88. The method of making sound records which consists in exposing a moving light sensitive record surface to a beam of light controlled in accordance with sound pulsations whereby a photographic line will be produced developing and fixing said line and treating said record to intensify said photographic effect and then producing by the use of said photographically produced record commercial sound records capable of reproducing the sound.

89. An apparatus for transmitting to a distance by telegraphic or telephonic methods a record of variations in light comprising means at the sending station which react to light to cause electrical variations corresponding to the variations in light, means at the receiving station for translating said electrical variations into corresponding variations in light intensity, and means for recording said last mentioned variations.

90. Means for electrically transmitting graphic messages including a message sheet of varying degree of transparency a source of light, means for projecting the light from said source of light through the portions of said message sheet successively, means which react to light upon which the rays of light are projected after passing through said message sheet, an electrical circuit including said light reacting means, means for transmitting the various undulations in the intensity of the current in said circuit caused by the action of the light rays upon the light reacting means to a receiving station, and a reproducing instrument including means for translating the varying undulations of said current into a visible reproduction of the transmitting message.

91. Means for electrically transmitting graphic messages including a visible record, a source of light, means which react to light, means for projecting upon said light reacting means rays from said source of light modified by and in accordance with successive portions of said record, an electrical circuit including said light reacting means, means for transmitting the various undulations in the intensity of the current in said

circuit caused by the action of the light rays upon the light reacting means to a receiving station, and reproducing means for translating the varying undulations of said
5 current into a visible reproduction of the transmitting record.

92. The combination with an electric circuit, of means therein which react to light to cause pulsations in said circuit corresponding to the variations in light reaching
10 said means, light controlling means including a shutter, and means operated by the pulsations in said circuit for controlling the movements of said shutter.

93. The combination with a source of light, of a movable record of variations in light adapted to modify the light transmitted from said source, an electric circuit,
15 means therein which react to light exposed to the action of said modified light to cause pulsations in said circuit corresponding to said variations, light controlling means, and
20 means operated by the pulsations in said circuit for operating said light controlling means in accordance with the modifications of light by said record.

94. Means for recording and reproducing

sound waves comprising a movable sensitized surface, means for moving said surface, an inclosure therefor, two shutters having coöperating light openings for controlling light reaching said surface, and means
30 for moving one of said shutters by and in accordance with sound pulsations.

95. Means for recording and reproducing sound waves comprising a casing, a movable sensitized surface therein, means for moving said surface, a shutter for controlling the admission of light to said surface in said casing, and means for vibrating said
35 shutter by and in accordance with sound waves.

96. Means for recording and reproducing sound waves comprising a casing, a movable sensitized surface therein, means for moving said surface, means for producing a constant light, a shutter for controlling the admission of said light to said surface in said casing, and means for vibrating said shutter
40 by and in accordance with sound waves.

CHARLES EDGAR FRITTS.

In presence of—

C. L. WILBUR,
R. GERRELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

BRAKE FOR TALKING MACHINES,
#1,203,418----C. O. Scott,
Patented-October 31st, 1916.
Filed-November 3rd, 1915.

C. O. SCOTT.
BRAKE FOR TALKING MACHINES.
APPLICATION FILED NOV. 3, 1915.

1,203,418.

Patented Oct. 31, 1916.

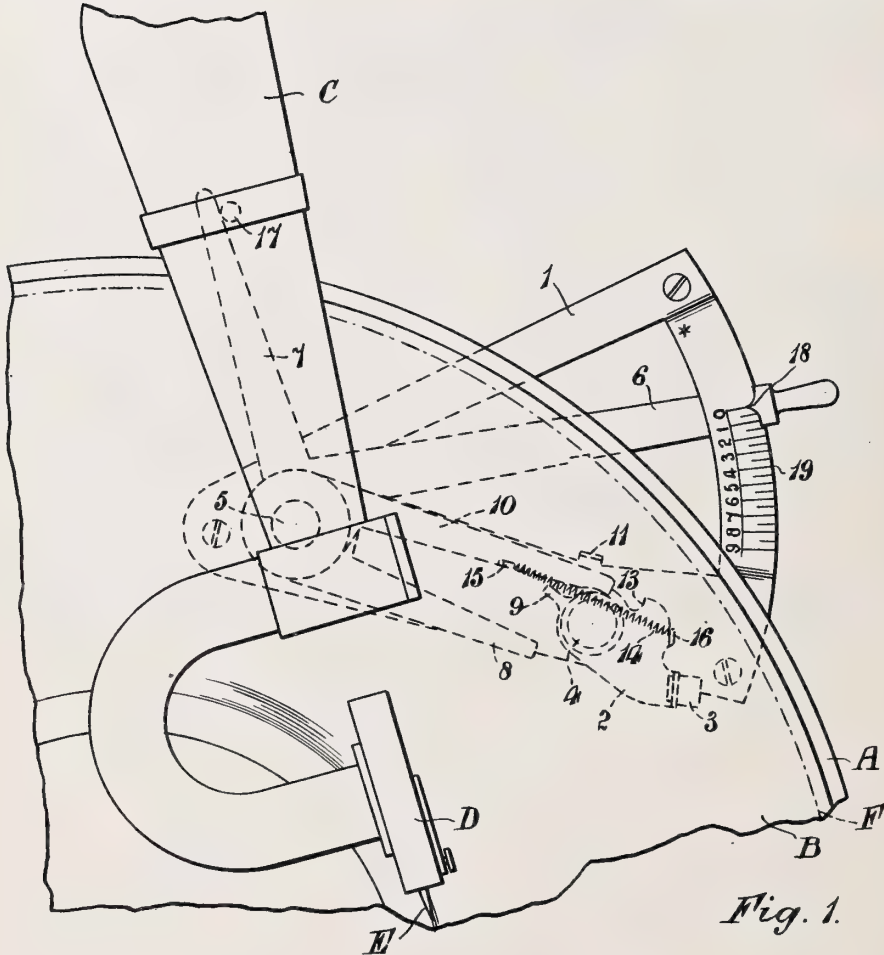


Fig. 1.

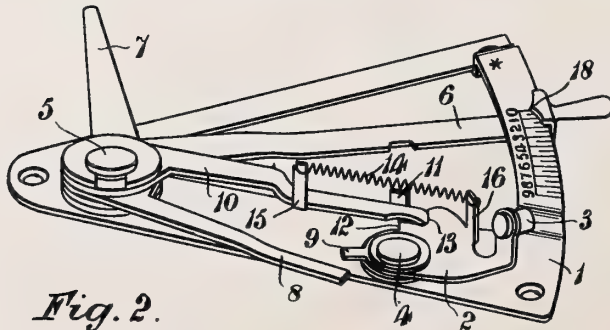


Fig. 2.

WITNESSES.

M. J. Andrews.
B. C. C. C. C.

INVENTOR.

Chas. O. Scott.

By

Stanley Lightfoot

ATTORNEY.

UNITED STATES PATENT OFFICE.

CHARLES O. SCOTT, OF GANANOQUE, ONTARIO, CANADA, ASSIGNOR OF ONE-HALF TO
JOHN W. SCOTT, OF NORTH BAY, ONTARIO, CANADA.

BRAKE FOR TALKING-MACHINES.

1,203,418.

Specification of Letters Patent.

Patented Oct. 31, 1916.

Application filed November 3, 1915. Serial No. 59,477.

To all whom it may concern:

Be it known that I, CHARLES O. SCOTT, of the town of Gananoque, in the county of Leeds, in the Province of Ontario, in the Dominion of Canada, have invented certain new and useful Improvements in Brakes for Talking-Machines, and do hereby declare that the following is a full, clear, and exact description of same.

This invention relates to talking machine brakes of the type adapted to control the starting and stopping of the rotation of the record carrying member of such talking machines the stopping of such rotation being automatically effected as the needle or reproducing point of the machine assumes a predetermined position upon the record, the object of the invention being to provide means whereby the release of the brake to allow the rotation of the record carrying member may be effected simultaneously with the adjustment of the means determining the position of the reproducer point at the moment when the cessation of such rotation of the said record carrying member is desirable.

A resultant object is to provide a brake operating member which is associated with means to automatically effect the release of said brake as hereinafter explained.

A further object is to provide registering means to indicate at what point in the operation of the machine the brake will be released to stop rotation of the record carrying member; and a still further object is to provide simplicity of operation in the device whereby movement in a forward and reverse direction of the brake operating member will be attended with the release of the record carrying member and the adjustment of the brake releasing mechanism.

In carrying the invention into effect I prefer to provide a base plate of quadrant form having near its apex a pivot upon which a three membered device is mounted, the intermediate member extending outwardly beyond the periphery of the quadrant and having the form of a lever adapted to be manually operated, hereinafter called the operating lever, the other of said members being hereinafter called the "trip arm" and the "brake arm" respectively. A further member, hereinafter called the "pawl arm", is also mounted upon said pivot and is frictionally associated with the first mentioned

three membered device. A brake, adapted to frictionally operate upon the record carrying member, is pivotally mounted upon said base plate and somewhat in proximity to the outer edge of the quadrant, the said brake being in the form of a flat plate carrying at its outer end the rubber or other means to engage with the record carrying member and having two recesses in proximity to the pivot in one or other of which recesses the outer end of the pawl arm may engage, resilient means being provided to retain the said pawl arm and the brake in their active relation. The brake is also provided with a projection which extends into the path of the brake arm whereby movement of the operating lever away from the brake will result in the engagement of the said brake arm with the said projection and the incidental movement of the brake, upon its pivot, to release the record carrying member, upon which movement of the said brake, the pawl arm will engage with one of the recesses to retain said brake in its inoperative position. The movement of the operating lever naturally entails the movement of the trip arm and will thereby effect an adjustment of the relation between the said trip arm and the sound arm of the talking machine which is desirable, and as the reverse movement of the said operating lever will not effect the operation of the brake, the adjustment of the trip arm may be made to any desired extent. A suitable trip is provided in connection with the sound arm of the machine to contact with the trip arm, as the reproducer point moves over the record and will result in the release of the brake, all of which is more particularly described and ascertained in and by the following specification and with reference to the accompanying drawing in which—

Figure 1 is a plan view of a disk talking machine partly broken away indicating the application of this invention thereto, and Fig. 2 is a detail perspective view of the brake mechanism detached from the machine.

Similar characters of reference indicate similar parts in both figures of the drawing.

A is the usual rotary record carrying member or table and B a disk record mounted thereon, while C is the sound arm of a talking machine to which is connected the reproducer, D carrying the needle E, the

parts A, B, C, D and E being well known and therefore not requiring further explanation.

The table is usually supported slightly above the top of a motor casing and upon this casing and more or less beneath the table A, I prefer to mount the brake mechanism constituting this invention.

This brake comprises preferably a quadrant shaped base 1 upon which a brake proper 2 is pivotally mounted, the said brake proper carrying the rubber 3, the term rubber being intended to indicate the function of the integer 3 and not the material of which it is composed.

4 is the brake pivot and 5 is a further pivot located in proximity to the apex of the base 1, as is illustrated in the drawing. the said pivot 5 forming the turning point for an operating lever 6, the outer end of which lever extends somewhat beyond the periphery of the quadrant. Integral with or rigidly connected with the said operating lever 6 is a trip arm 7 and a brake arm 8 preferably disposed so that the operating lever 6 is intermediate of said arms. The other end of the brake arm 8 is adapted when moved in an anti-clockwise direction (where the parts are arranged as indicated in the drawings) to contact with a projection 9 upon the brake 2 for the purpose hereinafter described.

10 is a pawl arm also mounted upon pivot 5 and frictionally associated with the trip arm 7, whereby movement of the said trip arm will be transmitted to the pawl arm to an extent limited by the stop 11 upon the base 1.

It will be seen that the brake is provided with recesses 12 and 13 with either of which recesses the extremity of the said pawl arm 10 may engage according to the position of the brake.

14 is a spring extending between projections 15 and 16 upon the pawl arm and brake respectively the said spring being in a state of tension.

17 is a pin which depends from the sound arm C to contact with the trip arm 7 as hereinafter described, this pin being merely indicated in dotted lines in Fig. 1 as being well understood.

The outer end of the operating lever is provided with a pointer 18 adapted to register with graduations 19 upon the quadrant according to the position of the lever.

The operation of the device will now be described;—Presuming that the parts are in the position indicated in Fig. 2, in which it will be seen that the rubber 3 is in a forward position, in which position under the influence of the spring 14 it would frictionally abut with the inside edge of the rim, usually found upon the underside of circular record tables, (this rim being indi-

cated in Fig. 1 of the drawing by the chain line F) such frictional abutment preventing the rotation of the said table, the operating lever 6 is moved away from the brake 2 to an extent which may be limited by suitable means or which may be indicated by a star upon the quadrant as is indicated in the drawing. This movement of the operating lever is attended by movement to a similar extent of the trip arm 7 and the brake arm 8 whereby the said brake arm will contact with the projection 9, upon the brake 2, and effect the movement of the said brake to the position as indicated in Fig. 1 when the extremity of the pawl arm 10 will engage with the recess 12 in the said brake by virtue of the action of the spring 14.

The movement of the brake to an inoperative position permits the record table to rotate, and as the sound arm C carrying the pin 17 swings, due to the movement of the needle E over the face of a record, the said pin 17 will eventually contact with the trip arm 7 at a point determined by the position of the trip arm, which position of the trip arm is also determined by the movement of the operating lever in an opposite direction to that necessary to bring the brake into its inoperative position or until the pointer 18 upon the operating lever 6 registers with one or other of the graduations upon the quadrant, the graduations being such that the point marked "O" will indicate that, when the pointer registers therewith, the trip arm is in such a position that the pin 17 will contact therewith upon the needle E approaching a determined radius from the center of the record.

The radius conforming with the graduation "O" represents the nearest line of sound waves to the center of the record usually found, the further graduations indicating various radii of sound wave lines at which point in reproduction contact between the said pin 17 and the trip arm 7 will take place. Thus upon the movement of the operating lever, until the pointer registers at one or other of the graduations, the brake arm 8 will be moved away from the projection 9, upon the brake 2, and the trip arm 7 brought to its adjusted position, and when the needle E has traveled across the record until it assumes the radial position indicated by the pointer 18, the pin 17 will contact with the trip arm 7 and thereby slightly move the said arm in an anti-clockwise direction when the pawl arm will be sprung from its engagement with the recess 12, due to the frictional relation of the pawl arm and said trip arm, the brake thus returning to its operative position under the influence of the spring 14 and preventing further rotation of the record table. Hence the cessation of the rotation of the record table automatically takes place as the playing of the

record or a part of the record is completed, as may be desired. It is suggested that the records should be numbered in order to indicate the radius of the final sound wave lines, or of sound wave lines representing the completion of a part of the record, such as one verse of a song, these numbers conforming with the particular graduations upon the quadrant to which they relate.

- 10 With a device of this description an extremely simple structure is provided having but one spring operating both the pawl arm and the brake, and an extremely simple operation of the operating lever is necessary in order to release the record carrying table and to regulate the trip arm, and it will also be understood that the stopping of the rotary movement of the record table may be readily effected irrespective of the automatic stopping, if desirable, merely by a slight movement of the operating lever in the direction of the star indicated upon the quadrant, whereby the pawl arm will be frictionally moved out of its engagement with the recess 12.

This invention may be developed within the scope of the following claims without departing from the essential features thereof and it is desired that the specification and drawing be read as being merely illustrative and not in a limiting sense, except as necessitated by the prior art.

What I claim as my invention is:

1. In a talking machine brake, a brake proper, means to temporarily retain said brake proper in an inoperative position, a brake arm, a trip arm, an operating lever adapted to positively actuate said brake arm and said trip arm, and a pawl arm frictionally associated with said trip arm said pawl arm determining the position of the said brake proper.

2. A talking machine brake comprising a brake proper, means to temporarily retain said brake proper in an inoperative position, a brake arm, a trip arm, an operating lever adapted to positively actuate said brake arm and said trip arm, a pawl arm frictionally associated with said trip arm to determine the position of said brake proper and a tensioned resilient member tending to retain said pawl arm and said brake proper in active relation.

3. In a talking machine brake, a brake set-

ting mechanism adapted to retain said brake temporarily in an inoperative position, a brake releasing mechanism adapted to operate automatically at a predetermined time to release said brake, a single lever, the operation of which will effect both the inoperative setting of said brake and the determining of the subsequent operation of said brake releasing mechanism, and a graduated member with which said lever registers to indicate the moment of release of said brake proper.

4. In a talking machine brake, a brake proper, means to temporarily retain said brake proper in an inoperative position, a brake arm, an operating lever adapted to positively actuate said brake arm and said trip arm, a pawl arm frictionally associated with said trip arm, said pawl arm determining the position of the said brake proper, and a graduated member with which said lever registers to indicate the moment of release of said brake proper.

5. A talking machine brake comprising a brake proper, means to temporarily retain said brake proper in an inoperative position, a brake arm, a trip arm, an operating lever adapted to positively actuate said brake arm and said trip arm, a pawl arm frictionally associated with said trip arm to determine the position of said brake proper, a tensioned resilient member tending to retain said pawl arm and said brake proper in active relation, and a graduated member to indicate by the position of said lever the moment of release of said brake proper.

6. A talking machine brake comprising a brake proper, means to temporarily retain said brake proper in an inoperative position, a brake arm, a trip arm, an operating lever integral with said brake arm and said trip arm, and a pawl arm frictionally associated with said trip arm, said pawl arm determining the position of the said brake proper.

Signed at the town of Ganonoque, in the county of Leeds, in the Province of Ontario, in the Dominion of Canada, this 21st day of October, 1915.

CHARLES O. SCOTT.

Witnesses:

BERTHA SULLIVAN,
G. BEIFER.

PHONOGRAPH.

#1,203,666-----E. Walker,

Patented-November 7th, 1916.

Filed-September 25th, 1907.

Renewed---March 30th, 1916.

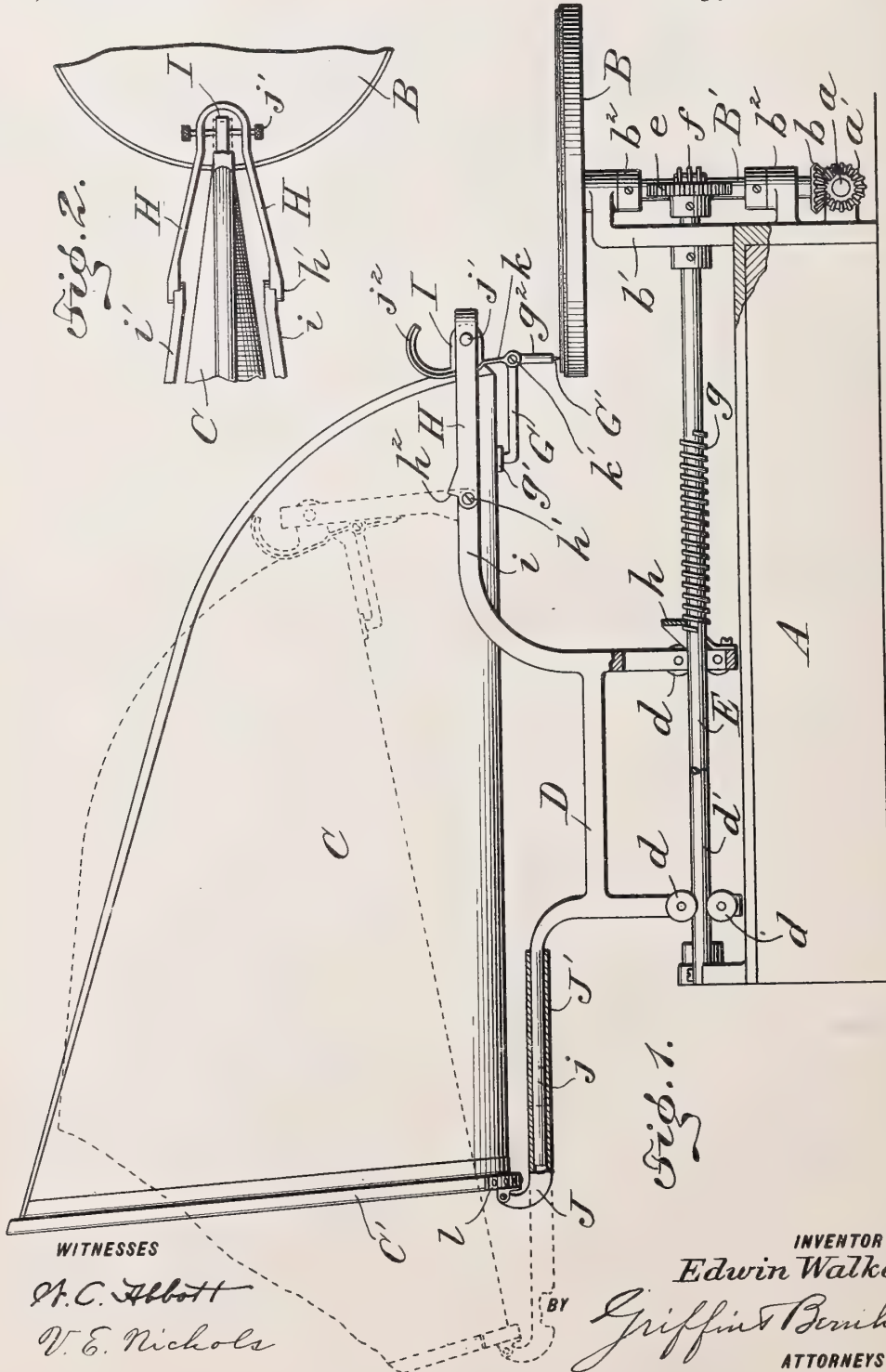
E. WALKER.
PHONOGRAPH.

APPLICATION FILED SEPT. 25, 1907. RENEWED MAR. 30, 1916.

1,203,666.

Patented Nov. 7, 1916.

2 SHEETS—SHEET 1.



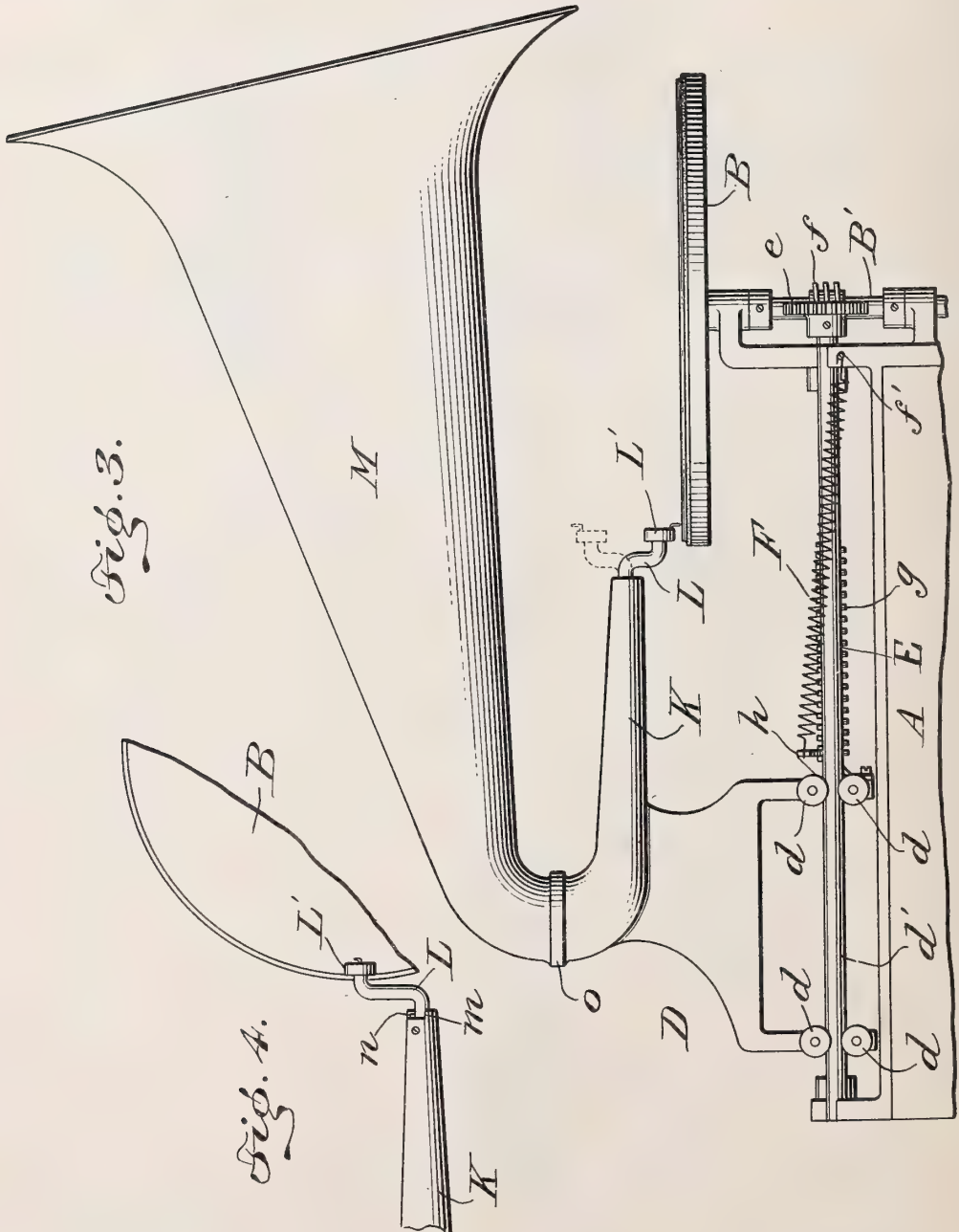
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PHONOGRAPH.

APPLICATION FILED SEPT. 25, 1907. RENEWED MAR. 30, 1916.

1,203,666.

Patented Nov. 7, 1916.

2 SHEETS—SHEET 2.



WITNESSES

W. C. Abbott

V. E. Nichols

INVENTOR

Edwin Walker

BY

Griffith Bonhard

ATTORNEYS

UNITED STATES PATENT OFFICE.

EDWIN WALKER, OF ERIE, PENNSYLVANIA.

PHONOGRAPH.

1,203,666.

Specification of Letters Patent.

Patented Nov. 7, 1916.

Application filed September 25, 1907, Serial No. 394,585. Renewed March 30, 1916. Serial No. 87,874.

To all whom it may concern:

Be it known that I, EDWIN WALKER, a citizen of the United States, residing in Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Phonographs, of which the following is a specification.

This invention is a phonograph or gramophone, the broadly new feature of which consists of means for mechanically carrying the reproducer and horn and positively moving the same relative to or across a rotating record.

In the present invention the machine is equipped with a traveling carriage which is separate from a rotatable record-carrier and is operated independently thereof, said record-carrier rotating on a fixed axis, and said carriage being in a rectilinear path movable toward and from said record-carrier. On said sliding carriage there is mounted the reproducer and horn, the stylus of which is arranged to travel in the groove of the record, and with said carriage coöperates means for positively moving the same, whereby the reproducer and horn are moved in a positive manner and across a record on the aforesaid rotatable record-carrier.

According to one embodiment of the invention, the traveling carriage and the reproducer are equipped with means which permits the operator to readily lift the reproducer away from the record, and to support such reproducer firmly in place while adjusted in a non-working position. Said construction enables the operator to remove a record from the record-carrier, and replace it by another one, without danger of mutilating or scratching either record by the stylus of the reproducer. At the same time, the reproducer and horn are supported in position against accidental dislodgment, and can be easily and quickly replaced for operation after the fresh record is placed on the record-carrier.

In the accompanying drawings, I have illustrated one practical embodiment of the invention, but the construction shown therein is to be understood as illustrative only, and not as defining the limits of the invention.

Figure 1 is a side elevation of a phonograph embodying my invention, certain parts being shown in vertical section. Fig. 2 is a detail plan view showing a portion of the construction illustrated in Fig. 1. Fig.

3 is a side elevation of another style of gramophone embodying the present invention. Fig. 4 is a detail view of a part of the machine shown in Fig. 3.

The machine shown in Fig. 1 has a casing, A, of any suitable character which is adapted to contain the motor for operating the record carrier, B, and the reproducer, C.

The motor (not shown) is connected operatively with a horizontal shaft, *a*, which is provided with a bevel gear, *a'*, the latter meshing with a bevel gear, *b*, which is provided on the lower end of a vertical shaft, *B'*, the latter supporting the record carrier B. The vertical shaft, *B'*, is journaled in suitable bearings, *b²*, of a bracket, *b'*, the latter being secured to the casing, A, or otherwise supported in a fixed position. The record carrier in the machine shown by this application is a flat table adapted for rotation in a horizontal plane, and on this table or carrier is adapted to be placed a disk like record of any known form.

The reproducer shown in Figs. 1 and 2 is a combined reproducer and horn of the type disclosed in the prior patents granted to me Nos. 805,544 and 805,600. Said reproducer and horn is mounted on a carriage, D, which carriage may be of any suitable or preferred construction. With said carriage is combined means for positively moving the same in a rectilinear path, and as the reproducer and horn is mounted on said carriage, it follows that the stylus is moved in a positive manner across the record while the latter is rotating with the carrier or table, B.

As shown, the carriage, D, is provided with rollers or wheels, *d*, adapted to ride on the track rods, *d'*, the latter being fixedly supported on the frame or casing, A, in a suitable way. These rods provide a horizontal track extending upwardly from the vertical plane of the shaft, *B'*, for the carrier or table, although the track may be of any construction adapted to support the carriage, D, for movement in a substantially horizontal path.

The means for positively moving the carriage, D, is preferably operated by or driven from the shaft, *B'*, and as herein shown, said carriage-driving means is embodied in the form of a horizontal screw shaft, E. Said shaft is arranged preferably in a horizontal position between the rods, *d'*, which form the track for the carriage, and said shaft is journaled in suitable bearings on

the upper part of the frame or casing, A. The shaft is provided at one end with a worm gear, *e*, which meshes with a worm, *f*, the latter being provided on the vertical shaft, B'. The carriage-driving shaft is provided with a coarse male thread, *g*, with which engages a feed nut or traveler, *h*, the latter being preferably in the form of a lever pivoted on the carriage, D, and held in engagement with the thread, *g*, in any suitable way. As shown in Fig. 3, the feed lever or traveler, *h*, is held in position on the thread of the feed shaft by a coiled spring, F, one end of said spring being anchored, as at *f'*, to a fixed part of the machine, whereby the spring holds the feed lever or traveler in engagement with the thread of the shaft, E, and at the same time said spring exerts a pulling effect on the carriage, D, so as to assist in drawing or moving the carriage, D, with the combined horn and reproducer toward the record carrier or table, B.

As shown, the carriage, D, is provided with two rearwardly extending arms, *i*, *i'*, between which is adapted to lie the lower inner part of the combined horn and reproducer C. The carriage is provided, furthermore, with a stem or spindle, *j*, which extends from said carriage in an opposite direction to the arms, *i*, *i'*, said stem or spindle occupying a horizontal position in a plane below the aforesaid arms.

The reproducer is equipped with a bell crank lever, G, one arm of which is connected operatively with the diaphragm or flexible material of the reproducer as at *g'*. The other arm of the bell crank is shown as having a stylus holder, *g''*, in which is supported a stylus, G', of any suitable character.

H designates a bail which is fitted loosely around the lower rear part of the combined horn and reproducer. Said bail has its end portions connected pivotally to the arms, *i*, *i'* of the carriage by screws, *h'*, and said pivoted ends of the bail are provided with the stop shoulder *h''*, which are adapted to engage with the arms, *i*, *i'*, when the bail and the reproducer are lifted to the inclined position shown by dotted lines in Fig. 1.

Within the bail, H, is a hanger, I, which hanger is supported in the bail near its closed end by a spindle or screw, *j'*. Said hanger has a depending member, *k*, on which is fulcrumed the bell crank, G, as at *k'*, and the hanger is provided also with an upwardly extending finger piece, *j''*, the same affording a convenient means for lifting the bail and the reproducer.

The bail, H, forms, practically, an extension or continuation of the carriage, D, and said bail, with the hanger and the bell crank, afford convenient means for supporting the inner part of the horn and repro-

ducer upon the record on the table or carrier, B.

The open front part of the horn and reproducer, C, is reinforced by a mouth stay or rib, C', and on the underside of this stay is secured a bracket plate, 1. To this plate is pivoted a curved arm, J, the same being provided with a sleeve, J', that is fitted loosely on the stem, *j*, of the carriage. The arm, J, engages with the stem, *j*, so as to support the front end of the horn and reproducer, the latter being connected pivotally with said arm in order that the reproducer may be adjusted on a horizontal pivot to the inclined position indicated by dotted lines in Fig. 1. The sleeve, J', is free to slide endwise on the stem *j*, when the horn and reproducer are raised, whereby the horn is adapted to be lifted and moved forward, and to be supported firmly in such position by the bail, H, and the arm, J, thus fully exposing the carrier or table, B, for the purpose of placing a record thereon or removing a record therefrom. The described construction enables the records to be interchanged without the possibility of scratching, defacing or mutilating said records by contact with the stylus of the reproducer, for the reason that the horn and reproducer, and the stylus are supported in a position removed from the table or carrier, B, the bail, H, resting firmly upon the arms, *i*, *i'*, of the carriage, all as shown by dotted lines.

The machine shown in Figs. 3 and 4 of the drawings is substantially the same as that heretofore described, except the form or reproducer and horn. As shown, the motor is incased within the frame or casing, A, said motor driving the vertical shaft, B', which is equipped with the carrier or table, B. Said vertical shaft has a worm, *f*, which meshes with a gear, *e*, on an end portion of the horizontal feed shaft, E, the latter being provided with the coarse thread, *g*. The carriage, D, is equipped with the rollers, *d*, adapted for engagement with the rods, *d'*, forming the track, and said carriage is provided with the feed lever, *h*, the latter being adapted for engagement with the coarse screw, *g*, with which it is kept in such engagement by the spring, F.

The carriage, D, is provided with a hollow arm, K, the inner end of which is provided with a notch, *m*. In said hollow arm is journaled a hollow cranked member, L, the latter being provided with a reproducer, L', of any suitable construction. The member, L, is free to turn in the hollow arm, K, and the rotary motion of this member is limited by a stop, *n*, the latter working in the notch, *m*, of said arm, K. The horn, M, is of any suitable construction, and it is connected with the arm, K. If desired, the horn, M, and the arm, K, may be fixed with relation to each other, but as shown, the horn has a

swiveled connection at *o* with the inner end of the arm, K, whereby the horn may be turned to any desired position with relation to the arm and the record of the table or carrier, B.

From the foregoing description taken in connection with the drawing, it will be observed that I have provided a carriage adapted to move in a rectilinear path, and to support a horn and reproducer in coöperative relation to a record adapted to be placed on a rotary carrier or table. Said table is positively rotated and the carriage is positively moved simultaneously, whereby the reproducer is given a traveling motion with respect to the rotary record.

Having thus fully described the invention, what I claim as new, and desire to secure by Letters Patent is:

1. In a phonograph, the combination with a record carrier, of a traveling carriage movable in a path radially with respect to the record carrier, a reproducing trumpet secured to said carriage and having a stylus positioned for contact with a record on said record carrier the weight of said trumpet being jointly supported by the carriage and the stylus, and means for slidably and pivotally securing the trumpet to said carriage, whereby the trumpet may be moved forwardly on the slidable connection and tilted upwardly on the pivotable connection to assume a position free from the record carrier.

2. In a phonograph, the combination with a rotatable record carrier, of a traveling carriage, impelling means for imparting movement to said carriage simultaneously with the rotation of the record carrier, said carriage being operated at less speed than the record carrier and being movable in a path radially to said record carrier, a reproducing trumpet the weight of which is imposed jointly upon said traveling carriage and upon a stylus coöperating with the reproducing trumpet, and means for slidably and pivotally connecting said trumpet to said carriage.

3. In a phonograph, a traveling carriage,

a bail pivoted thereto, and a trumpet pivoted to the carriage and to the bail for the purpose of properly positioning the trumpet in operative relation to a disk or record.

4. In a phonograph, a traveling carriage, a bail pivoted thereto, and a combined trumpet and reproducer pivoted to the carriage and to the bail for the purpose of properly positioning the reproducer and trumpet in operative relation to a disk or record, said bail being adapted to be swung on its pivotal axis for tilting the trumpet, whereby the reproducer is removed from its operative position relative to the disk or record.

5. In a phonograph, a traveling carriage, a reproducer and trumpet pivotally and slidably connected to said carriage, and a bail pivoted to the carriage and connected to the trumpet and reproducer for supporting the latter in a raised position.

6. In a phonograph, a traveling carriage, a bail pivoted thereto, a trumpet and reproducer lying in the bail, and a member connected to said reproducer and to the bail for supporting the trumpet on the bail.

7. In a phonograph, the combination with a record carrier, and a traveling carriage, of a trumpet the weight of which is jointly imposed upon the carriage and on a reproducer mounted on the trumpet and normally resting on a record positioned on the record carrier, the rear part of said trumpet overhanging said record carrier, means for pivotally connecting the forward part of said trumpet to the carriage, and a lifting member pivoted to the carriage and to the trumpet, said lifting member being operable to lift the trumpet on its pivotal connection with the carriage and to support the trumpet in said lifted position.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWIN WALKER.

Witnesses:

JAS. H. GRIFFIN,
H. I. BERNHARD.



PHONOGRAPH,
#1,203,667-----E. Walker,
Patented-November 7th, 1916.
Filed-Sept. 20th, 1907.
Renewed-March 30th, 1916.

APPLICATION FILED SEPT. 25, 1907. RENEWED MAR. 30, 1916.

Patented Nov. 7, 1916.

5 SHEETS—SHEET 1.



St. C. Abbott
V. E. Nichols

Edwin Walker

BY *Griffin & Bernhard*
ATTORNEYS

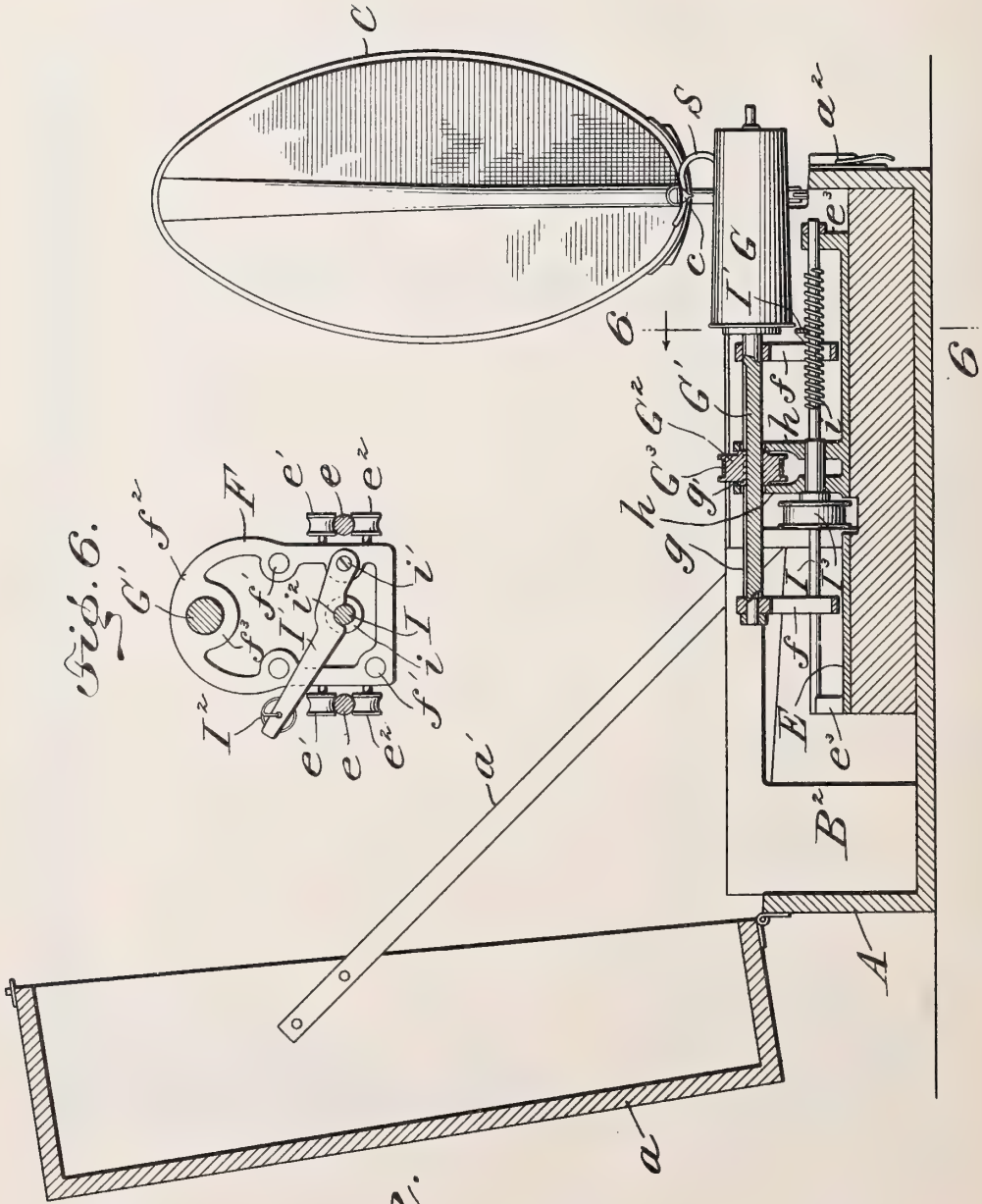
PHONOGRAPH.

APPLICATION FILED SEPT. 25, 1907. RENEWED MAR. 30, 1916.

1,203,667.

Patented Nov. 7, 1916.

5 SHEETS--SHEET 2.



WITNESSES

St. C. Abbott
V. E. Nichols

fig. 2.

INVENTOR

Edwin Walker

BY *Griffin Bernhard*
ATTORNEYS

ATTORNEYS

E. WALKER.
PHONOGRAPH.

APPLICATION FILED SEPT. 25, 1907. RENEWED MAR. 30, 1916.

1,203,667.

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5 SHEETS—SHEET 3.

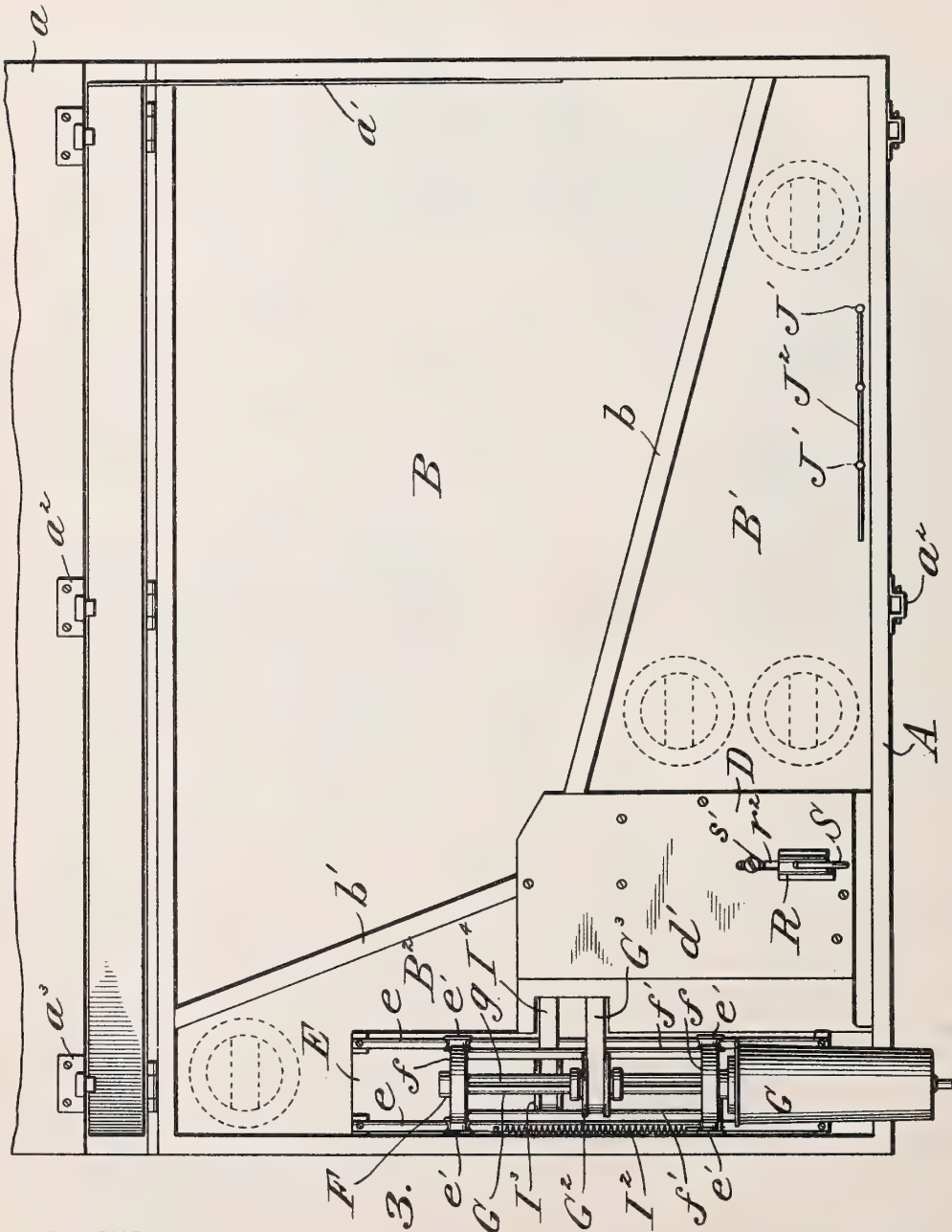


Fig. 3.

WITNESSES

H. C. Abbott
V. E. Nichols

INVENTOR

Edwin Walker

BY Griffin Bernhard
ATTORNEYS

E. WALKER.
PHONOGRAPH.

APPLICATION FILED SEPT. 25, 1907. RENEWED MAR. 30, 1916.

1,203,667.

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5 SHEETS—SHEET 4.

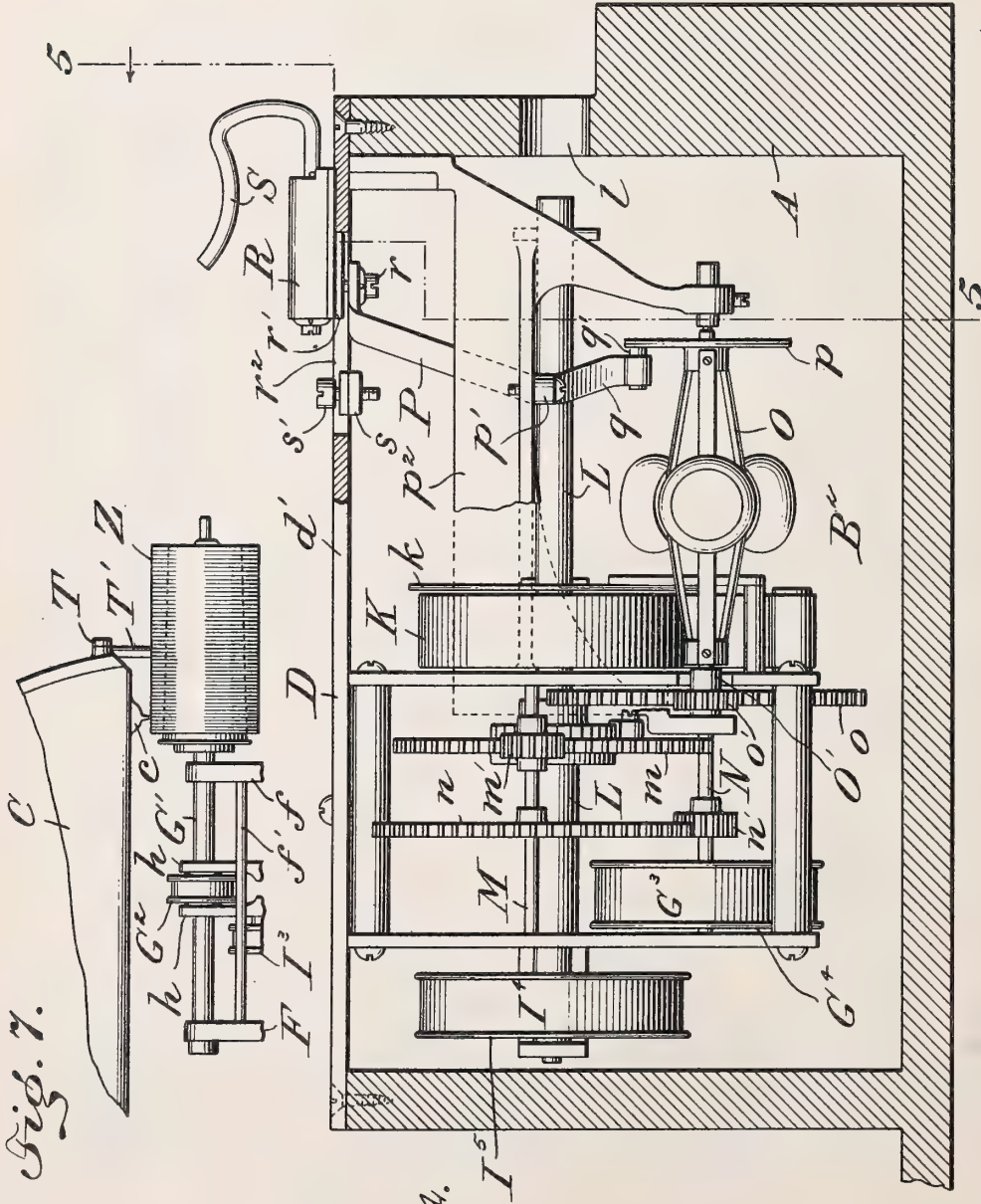


Fig. 7.

Fig. 4.

WITNESSE,
H. C. Abbott
V. E. Nichols

INVENTOR
Edwin Walker
BY *Griffin & Bernhard*
ATTORNEYS

E. WALKER.
PHONOGRAPH.

APPLICATION FILED SEPT. 25, 1907. RENEWED MAR. 30, 1916.

1,203,667.

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5 SHEETS—SHEET 5.

Fig. 8.

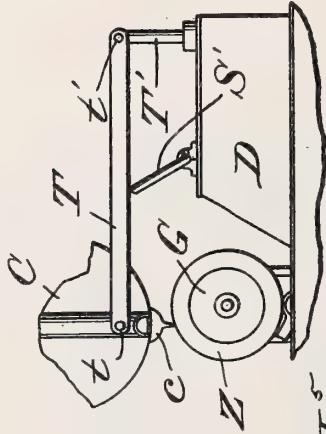
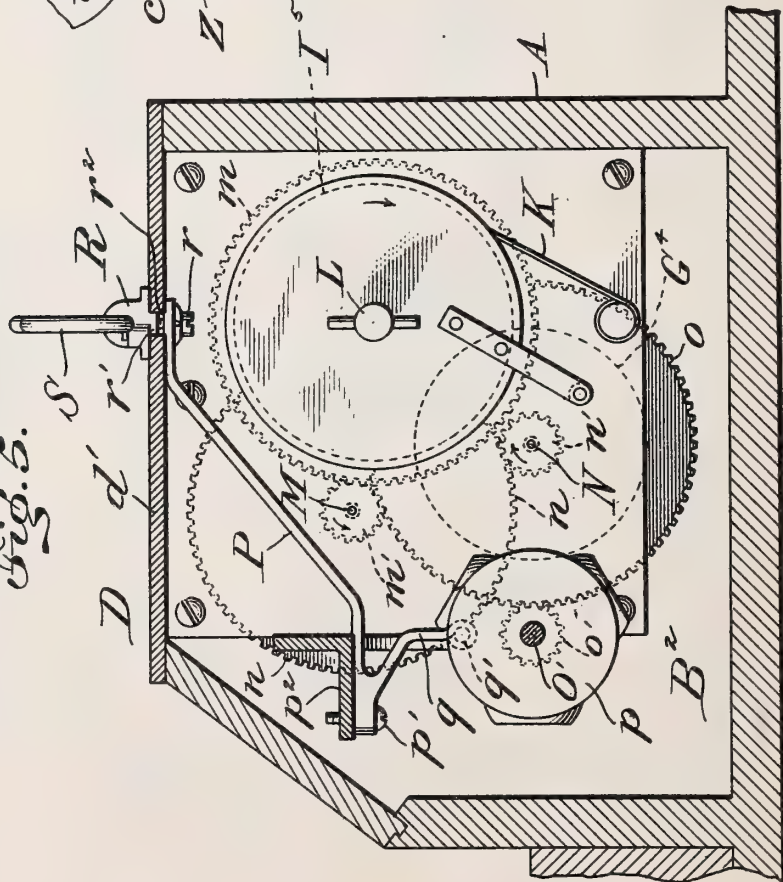


Fig. 5.



WITNESSES

W. C. Abbott
W. E. Nichols

INVENTOR

Edwin Walker

BY *Griffin Bernhard*
ATTORNEYS

UNITED STATES PATENT OFFICE.

EDWIN WALKER, OF ERIE, PENNSYLVANIA.

PHONOGRAPH.

1,203,667.

Specification of Letters Patent.

Patented Nov. 7, 1916.

Application filed September 25, 1907, Serial No. 394,584. Renewed March 30, 1916. Serial No. 87,875.

To all whom it may concern:

Be it known that I, EDWIN WALKER, a citizen of the United States, residing in Erie, in the county of Erie and State of Pennsylvania, have invented a certain new and useful Phonograph, of which the following is a specification.

This invention is a phonograph the carrier for the record of which is simultaneously rotated and given a traveling movement with respect to a relatively stationary reproducer.

According to one embodiment of this invention, the record-carrier is mounted on a traveling carriage, and with said carriage and the record-carrier are combined devices for simultaneously rotating the record-carrier and for feeding the carriage at a proper rate of speed, the movement of the carriage being a slow one as compared with the speed of the record carrier.

The carriage, its operating devices, and the driving means for the record carrier are simple and durable in construction, and operate with very little friction, wear and perceptible noise.

A broadly new feature of the instrument consists of means for simultaneously adjusting the reproducer and controlling the motor which operates the record-carrier, whereby records may be removed and replaced without scratching or mutilating them by the stylus of the reproducer, the latter being supported firmly in position and out of the way during such interchange of the records.

The reproducer which it is preferred to employ is of the character disclosed in my prior Patents No. 805,544 and No. 805,600, as well as in a copending application Serial No. 394,586, filed on even date herewith.

For the purpose of conveniently carrying the reproducer and the entire machine, it is preferred to provide a portable case in which the motor and working parts of the machine are installed permanently, said case being provided with compartments for the reception of the reproducer as well as of a number of records, etc.

As disclosed in the aforesaid patents and application, the reproducer is provided with a plurality of styli, and it is adjustable lengthwise for bringing either stylus into engagement with a record.

According to the present invention, the reproducer is, preferably, equipped with

means for supporting it firmly in either of several adjusted positions. Said supporting means restrains the reproducer from sidewise movement in a horizontal plane, but permits free movement in a vertical plane. One element of the aforesaid supporting means is foldable into compact relation with the reproducer when the latter is dismantled and packed in the aforesaid portable case, whereby the reproducer may be easily removed or replaced, as desired.

In the accompanying drawings, I have illustrated one practical embodiment of the invention, but the construction shown therein is to be understood as illustrative only, and not as defining the limits of the invention.

Figure 1 is a side elevation showing the portable case in an open position and the parts of the phonograph adjusted in position ready for use, the combined horn and reproducer being supported in a raised position with respect to the record carrier or mandrel, in order that a cylindrical record may be placed readily on said carrier or mandrel. Fig. 2 is a vertical cross section through the portable casing, showing certain parts of the machine in longitudinal section and side elevation, the combined horn and reproducer being illustrated in end elevation. Fig. 3 is a plan view of the portable casing and the phonograph, the horn and reproducer being removed. Fig. 4 is a vertical section on an enlarged scale and in the plane indicated by the dotted line 4—4 of Fig. 1 looking in the direction of the arrow, the reproducer and horn being omitted. Fig. 5 is a vertical section taken on the line 5—5 of Fig. 4 looking in the direction of the arrow. Fig. 6 is a detail cross section through a part of the carriage, showing the feed shaft and the feed lever or traveler which coöperates with said shaft, the plane of the section being indicated by the dotted line 6—6 of Fig. 2. Figs. 7 and 8 are views in side and end elevation illustrating another embodiment of the invention.

For convenience in transporting the machine and the records, I have shown a portable casing, A, which is provided with a hinged cover, a, adapted to be held in an open position by a brace, a', said cover when closed being locked in place by suitable fastenings, a². The casing, A, is divided by partitions, b, b', into a plurality of com-

partments, B, B', B². The compartment, B, is adapted to receive the combined horn and reproducer, C, when the latter is dismounted from operative relation to a record. The compartments, B', B², provide for the storage of a number of records, and between said compartments is a motor casing, D, which contains the operating parts of the motor whereby the record is rotated on its axis and moved endwise with respect to the combined horn and reproducer.

Within the compartment, B², is mounted or secured a base plate, E, the same extending crosswise of the portable casing, A, at one end thereof. This base plate is provided with longitudinal parallel rods, *e*, *e*, which form a track for a slidable carriage, F. Said carriage is shown as consisting of the members, *f*, *f*, each of which is cast in a single piece of metal, substantially in the form represented in Fig. 6. The members of the carriage are joined rigidly together by appropriate longitudinal tie-rods, *f'*, and said members are provided with the arched or curved upper end, *f*², each being formed with a depending perforated lug, *f*³, see Fig. 6. At the respective sides of the carriage are grooved rollers or wheels, *e'*, *e*², the rollers, *e'*, being adapted to ride upon the rods, *e*, of the track, while the rollers, *e*², ride against the underside of said rods, whereby the carriage is limited to sliding movement on the track, and the vibration of said carriage is minimized by the engagement of the rollers with said track. The carriage supports a record carrier, G, herein shown as a tapering mandrel for the reception of cylindrical records. Said mandrel is provided with a shaft, G', which extends lengthwise of the carriage and is journaled in the apertured lugs, *f*³, of the members, *f*, composing said carriage. The shaft, G', is mounted for rotation freely within its bearings of the carriage and it is moved endwise with said carriage, whereby the mandrel, G, is adapted for both rotary and endwise movement. The mandrel, G, is mounted on a shaft, G', and this shaft is provided with a longitudinal groove or key-way, *g*, in which works a spline or feather indicated by dotted lines at *g'* in Fig. 2, said spline or feather serving to operatively connect a driving pulley, G², with the mandrel shaft. This pulley is held from sliding with said shaft, G', by fitting it loosely between a pair of upstanding posts, *h*, which are made fast with the bed plate, E. It will be understood that the pulley, G², is driven by the motor for the purpose of rotating the shaft, G', and the mandrel thereon, but as said shaft and mandrel are moved endwise by a feed mechanism, to be presently described, the pulley, G', is restrained by the posts, *h*, from sliding with said shaft, whereby the pulley which imparts rotary motion to the mandrel has

a fixed or predetermined relation to the motor.

I designates a feed shaft which is journaled in appropriate bearings, *e*³, of the bed plate, E, said shaft being preferably below the mandrel shaft, G', parallel thereto and extending loosely through the members, *f*, of the traveling carriage. It is preferred to provide a coarse male thread, *i*, on this feed shaft, and with said male thread engages a feed lever or traveler, I'. Said traveler is pivoted at one end, as at *i'* to the carriage, see Fig. 6, and the lever is notched at a point intermediate of its ends, as at *i*², whereby the lever fits snugly to the feed shaft, I, and is adapted to work in the thread thereof. Said lever is held in engagement with the thread of the feed shaft by a coiled spring, I², one end of which is fastened to the free end of said lever, and the other end is anchored at a fixed point within the portable case, A. The principal function of this spring is to impart endwise movement to the carriage which carries the rotating record, and said spring thus takes off the motor or driving mechanism the labor of propelling the carriage. In this connection it is to be noted that the carriage, while actuated by the spring, is controlled by the feed shaft, and this shaft is operated by the motor, the functions of said motor being, mainly, to rotate the mandrel and the feed shaft.

It is evident, that the lever, to which the spring is attached, may be lifted by hand from engagement with the screw shaft, for the purpose of moving the carriage without hindrance from the shaft in one direction or the other, thus permitting the carriage and the record to be easily and quickly returned to a starting position.

The feed shaft, I, is provided with a pulley, I³, which is adjacent to and below the pulley, G², on the mandrel shaft. Said pulleys, G², I³, are driven by belts, G³, I⁴, see Fig. 3, said belts being operated by pulleys, G⁴, I⁵, of the motor, see Fig. 4.

The combined horn and reproducer, C, is of the shape more particularly shown in Figs. 1 and 2, said horn and reproducer being constructed as disclosed in my prior patents and in a copending application filed on even date herewith, Serial No. 394586. The element, C, is provided with a plurality of styli, *c*, which are fixed to the base of the reproducer, near the closed rear part thereof, and said reproducer is mounted for adjustment longitudinally of the casing, whereby either of the styli, *c*, may be brought into engagement with a record on the mandrel, G. The reproducer is provided at its front portion with a supporting bracket, J, the upper part of which is connected pivotally at *j* to a plate, *j'*, the latter being fixed to a rib, *c'*, at the mouth portion of the reproducer. This supporting bracket is foldable

within the open mouth of the reproducer when the latter is dismounted from the machine, and is adapted to be stored within the compartment, B, of the portable case. The supporting bracket is adapted to be fitted adjustably on the portable case, A, by any suitable means, but it is preferred to construct said supporting bracket in a way to hold the reproducer, C, from vibration sideways, and at the same time, secure the necessary longitudinal adjustment of the reproducer, while permitting it to vibrate on the horizontal axis afforded by the pivot, *j*. As shown in Fig. 1, the supporting bracket, J, is provided with a longitudinal socket, *j*², in which is adapted to be fitted either of the supporting pins or stems, J'. Said stems are attached or made integral with a plate, J², and the stems are spaced on said plate at intervals corresponding to the intervals between the styli, *c*. The plate, J², is fastened to the casing, A, in a suitable way, and the upper edge of said plate projects above the corresponding edge of the casing. The bracket, J, is provided with an angular foot piece, J³, which is forked as at *j*³ so as to embrace the projecting top edge of the plate, J². When the reproducer is mounted for the bracket, J, to fit on the first stem, J', the forked foot, J³, engages with the plate, J², and the first stylus, *c*, is adapted to rest on the record of the mandrel, G. To bring the second stylus into position for operation, the bracket, J, and the reproducer are lifted so as to withdraw said bracket from the first stem, after which the bracket may be slipped over the second stem, J², and locked into position for the foot to again engage with the plate, whereupon the second stylus is in position for coöperation with the record. This adjustment of the reproducer and its supporting bracket may be performed to bring the third stylus into coöperative relation with the record, but it is to be noted that in either of the several positions of the reproducer the foot, J³, of the bracket is adapted to engage with the plate, J², for holding the reproducer against sidewise movement.

In Figs. 4 and 5 of the drawings, I have shown one form of motor which has been found to give good results in practice, but it is to be understood that I do not intend to restrict myself to the use of any particular form of motor, for the reason that said motor may be modified and changed within wide limits. As shown, the driving spring, K, is anchored at one end within the casing, D, but the other end of this spring is made fast with a disk or drum, *k*, or said end of the spring may be secured rigidly to the main driving shaft, L. Said shaft is mounted in suitable bearings within the casing, D, and in one side of the casing, D, or the portable case, A, is an opening, *l*, which is in

alinement with the end portion of the main shaft, L, whereby a key or crank may be introduced through said opening and engage with an end portion of the shaft, L, for the purpose of turning the latter in order to place the driving spring, K, under tension. As is usual in the art, a detent mechanism, such as a pawl and ratchet (not shown) is employed for holding the driving spring against unwinding. On this shaft, L, is rigidly secured the driving pulley, I⁵, which operates the feed shaft, I, at the required speed. Said shaft, L, is provided with a gear, *m*, which meshes with a pinion, *m'*, on a counter shaft, M, and this counter shaft is provided with a gear, *n*, which meshes with a pinion, *n'*, on a shaft, N. Said shaft is provided with a gear, *o*, having intermeshing engagement with a pinion, *o'*, on a short shaft operating the centrifugal governor mechanism, O, the latter being of any suitable or preferred construction. Said governor operates a brake disk, *p*, with which is adapted to engage a suitable form of regulator for controlling the speed of the motor, and consequently the speed of the pulleys which operate to impart the sliding and rotary movement to the mandrel, G.

The driving pulley, G⁴, which operates the belt, G³, for rotating the mandrel is carried by the shaft, N, and the shafts, L, N, are so arranged for operation that the carriage, F, will be moved endwise at the required speed and the mandrel, G, will be operated at a different speed, whereby the record is moved endwise and rotated simultaneously to operate the reproducer.

One of the important features of my new machine is a combined reproducer support and stop mechanism for the motor, said device operating to lift the reproducer from the record simultaneously with the stoppage of the motor, and vice versa, said mechanism operates to start the motor simultaneously with the adjustment of the reproducer into coöperative relation with the record. Various devices may be employed for performing this function, but in Figs. 4 and 5 of the drawings, I have shown a simple and effective means for this purpose. A brake lever, P, is arranged within the motor casing, D, and said lever is fulcrumed at *p'* on a fixed bracket arm, *p*². The lever is provided with a depending arm, *q*, which carries the brake shoe, *q'*, of leather, felt or other material, said brake shoe being supported opposite to the brake disk, *p*, of the centrifugal governor, see Fig. 4. The lever, P, extends upward to the top portion, *d'*, of the motor casing, and said end of the lever is connected by a screw, *r*, with a slide, R, the latter resting upon the top, *d'*, of said motor casing. Said slide is provided on its underside with a rib, *r'*, arranged to work in a slot, *r*², of the motor casing, and the slide is

equipped with a bent arm, S, which extends upwardly from the slide, and is preferably curved to form a seat on which is adapted to rest the underside of the reproducer, C. The slide is movable in the slot, r^2 , of the motor casing, and the range of adjustment of the slide is regulated by a stop, s, which is fitted in the slot, r^2 , and is adapted to be fixed at different points therein by a screw, s' , said stop being in the path of the slide, R. The slide, R, may be moved in the slot, r^2 , for the purpose of adjusting the seat, S, below the reproducer, C, for the purpose of supporting said reproducer in a raised position wherein the styli are above the path of the record, substantially as shown in Fig. 1, said reproducer turning on the pivot, j, when the rest, S, is thrust beneath it. Said inward movement of the slide and seat turns the lever, P, on its fulcrum, p' , and moves the brake shoe, q' , into engagement with the brake disk, p, whereby the inward movement of the slide, R, simultaneously brings the seat, S, into engagement with the reproducer and applies the brake shoe, q' , against the disk, p, for the purpose of arresting the governor, O, and the motor. The reproducer is adapted to be supported by the seat, S, in a position wherein the styli, c, are above the record, and as the mandrel, G, is at rest, a record may be withdrawn from said mandrel and a new record placed thereon, such interchange of the records being effected without danger of scratching or mutilating the records.

The mandrel, G, and the reproducer, C, are at right angles to each other, said reproducer extending lengthwise of the portable case, A, and said mandrel being moved endwise in a path at right angles to the reproducer. Such arrangement and operation of the parts is quite desirable when the entire machine is to be carried or packed in a portable case, but it is to be understood that the invention is not confined to the employment of a record mandrel movable in a path at right angles to the axis of a reproducer. In Figs. 7 and 8 of the drawings, I have shown a phonograph wherein the cylindrical endwise movable mandrel is arranged in a parallel relation to the reproducer, the said mandrel being movable lengthwise in a path parallel to the longitudinal axis of said reproducer. The mandrel is carried by a shaft, G' , which is mounted in a carriage, F, and said carriage is moved endwise by a feed shaft while the mandrel is rotated from the motor by a pulley, all as heretofore described. The reproducer, C, may be equipped with a single stylus, c, or with a plurality of styli, and said stylus of the reproducer is adapted to rest on the record, Z, at a point located to one side of the vertical plane of the mandrel shaft, see Fig. 8. This relation of the reproducer to the mandrel prevents

the stylus from sliding in one direction off the record, but the movement of the reproducer in the other direction is limited by a suitable anchor herein shown as an arm, T, one end of which is pivotally connected as at t to the reproducer, while the other end is pivoted at t' to a fixture, T', adapted to be fastened to the motor casing, D.

The apparatus shown in Figs. 7 and 8 is operated in practically the same way, and by the same means, as the structure shown in the other figures of the drawings, except that the record is moved endwise in a path substantially parallel to the longitudinal axis of the reproducer and horn. In this connection attention is called to the fact that the record mandrel is mounted on the carriage, F, for movement below and lengthwise of the reproducer and horn, and in connection with the last named element, I employ the combined support and brake. The support, S', of Fig. 8 is adapted for engagement with the arm, T, for the purpose of lifting the arm and the reproducer when the brake is applied to arrest the motor, but a reverse operation takes place, as heretofore described, when the support and brake are adjusted, whereby the support lowers the reproducer on the record simultaneously with the operation of releasing the brake.

Having thus fully described the invention, what I claim as new, and desire to secure by Letters Patent is:

1. In a phonograph, a reproducer, a record carrier, a motor for operating one of said parts, a brake element separate from the record carrier, said brake element being rotated by the motor, and a combined brake and reproducer support coöperating with the motor driven brake element and with the reproducer, whereby an adjustment to one position of the combined brake and reproducer support operates to separate the reproducer and the record carrier relatively to each other and to apply the resistance of the brake to the motor.

2. In a phonograph, a relatively stationary reproducer, a mandrel shaft adapted to carry a record mandrel, a motor including a rotatable brake element, said brake element being separate from the record mandrel, means operated by the motor for imparting to the mandrel shaft and the record mandrel a slidable and rotative movement relative to the reproducer, and a combined brake and reproducer support coöperating directly with the motor-driven brake element and with the reproducer.

3. In a phonograph, a non-traveling reproducer, a mandrel shaft adapted to carry a record mandrel, a motor, means operated by the motor for imparting to the mandrel shaft and the record mandrel a slidable and rotative movement relative to the reproducer, a brake element separate from the rec-

ord mandrel, said brake element being operated directly by the motor, and means cooperating with the motor driven brake element and with the reproducer whereby the
 5 reproducer may be moved relatively to the record mandrel and the motor arrested at one operation.

4. In a phonograph, a non-traveling reproducer, a mandrel shaft adapted to carry
 10 a record mandrel, a motor, means operated by the motor for imparting to the mandrel shaft and the record mandrel a slidable and rotative movement relative to the reproducer, a brake element separate from the record
 15 mandrel, said brake element being rotated directly by the motor, a second brake member cooperating with the rotatable brake member, a reproducer support movable to a position for lifting the reproducer from
 20 contact with a record on the record mandrel, and means connecting the reproducer support with the second brake member, whereby the adjustment of the reproducer support to one position operates the connecting
 25 means to apply the second brake member to the rotatable brake member.

5. In a phonograph, a non-traveling reproducer, a mandrel shaft adapted to carry
 30 a record mandrel, a motor, means operated by the motor for imparting to the mandrel shaft and the record mandrel a slidable and rotative movement relative to the reproducer, a brake element separate from the record
 35 mandrel, said brake element being rotated directly by the motor, a second brake member cooperating with the rotatable brake member, a slidable reproducer support movable into and out of engagement
 40 with the reproducer, and a brake lever intermediate the reproducer support and the second brake member for applying the latter to the rotatable brake member when the reproducer support lifts the reproducer from
 45 cooperative relation with the record mandrel.

6. In a phonograph, a non-traveling reproducer, record supporting means, driving
 50 mechanism therefor, a rotatable brake member separate from the record support and operated directly by the driving means, a manually operated reproducer support slidable
 55 beneath the reproducer and adapted to lift the latter from a record, a second brake member cooperating directly with the rotatable brake member, and a lever intermediate the second brake member and said reproducer support.

7. In a phonograph, a non-traveling reproducer, record supporting means, driving
 60 mechanism therefor, a rotatable brake member separate from the record support and operated by the driving means, a manually operated reproducer support operable at will to lift the reproducer from cooperative
 65 relation with said record supporting means,

and a brake lever connected directly with said reproducer support and cooperating with the rotatable brake member.

8. In a phonograph, a nontraveling reproducer, a carriage mounted for sliding
 70 movement relative to said reproducer, a shaft mounted on the carriage for rotation thereon and for sliding movement therewith, a record mandrel mounted on the shaft, a feed shaft operatively connected
 75 with the carriage for the purpose of imparting sliding movement thereto, a motor, a driven member mounted on the mandrel shaft and rotatable with said shaft, said driven member cooperating with the motor
 80 and with the mandrel shaft for the purpose of rotating said shaft, means for restraining the driven member from partaking of the sliding movement of the mandrel shaft, and a separate driving connection intermediate
 85 the motor and the feed shaft.

9. In a phonograph, a feed shaft having a coarse male thread, a traveling carriage, a
 90 feed lever fulcrumed on the carriage and fitting the thread of said shaft, and a spring connected to said feed lever and acting in a two-fold capacity to retain the feed lever in engagement with the threads of the feed
 95 shaft and to propel the traveling carriage in a given path.

10. In a phonograph, a feed shaft having a male thread, a carriage, a feed lever extending crosswise of the shaft and positioned above the same, said feed lever engaging
 100 with the thread of the shaft and adapted to be lifted at will free from engagement therewith, and a spring for applying tension to the feed lever whereby the carriage is moved in one direction and the lever is retained in operative relation to the feed
 105 shaft.

11. In a phonograph, a bed plate having a track, a carriage slidable on the track, a
 110 feed shaft extending through the carriage and connected operatively therewith, a mandrel shaft mounted on the carriage, fixed posts through which the mandrel shaft is adapted to slide, and a pulley splined on the mandrel shaft and restrained by the posts
 115 from sliding therewith.

12. In a phonograph, a non-traveling reproducer, a carriage slidable relatively
 120 thereto, a record-carrier mounted on said carriage for slidable movement therewith, a spring for directly moving said carriage in one direction, means for controlling the travel of said carriage under the action of said spring, and means for rotating the record-carrier at the same time it partakes of the sliding movement of the carriage rela-
 125 tive to the reproducer.

13. In a phonograph, a non-traveling reproducer, a traveling record-carriage, a slidable and rotatable record carrier mounted
 130 on said record carriage, tension means co-

operating with the record-carriage for imparting traveling movement to the record carrier relatively to said reproducer, motor-driven feed mechanism for regulating the
5 travel of said record-carriage, means for rotating the record carrier simultaneously with the feed motion of said record carrier with the carriage, and means for stopping the feed mechanism and for shifting the re-
10 producer from operative relation to the record carrier.

14. In a phonograph, the combination of a traveling carriage, carriage controlling means associated therewith, means for actu-

ating the carriage controlling means, means 15
connecting the carriage to the carriage controlling means, and tension means for automatically maintaining the connecting means in operative position and simultaneously
imparting sliding movement to the carriage. 20

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWIN WALKER.

Witnesses:

JAS. H. GRIFFIN,
H. I. BERNHARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

MACHINE FOR MAKING SEAMLESS
CELLULOID ARTICLES,

#1,203,947-----J.N.Whitehouse,
Patented-Nov. 7th, 1916.
Filed-April 25th, 1912.

1,203,947.

4 SHEETS--SHEET 1.



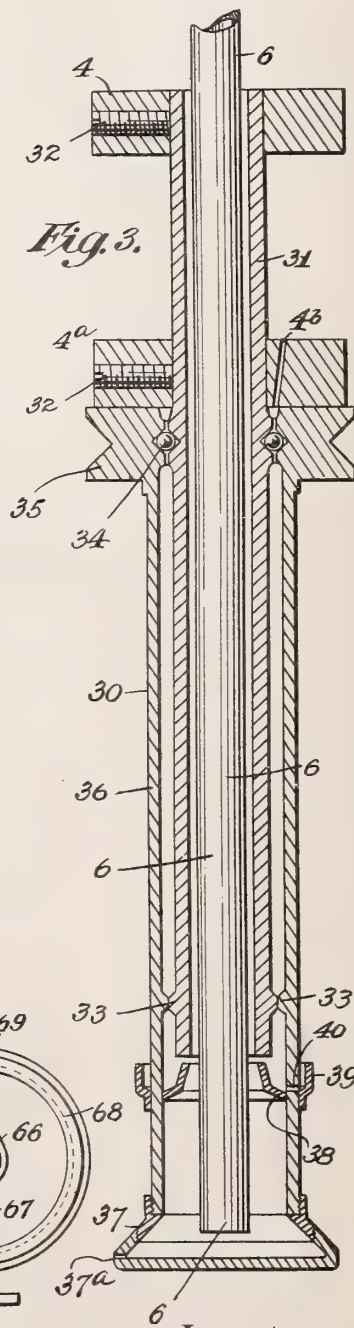
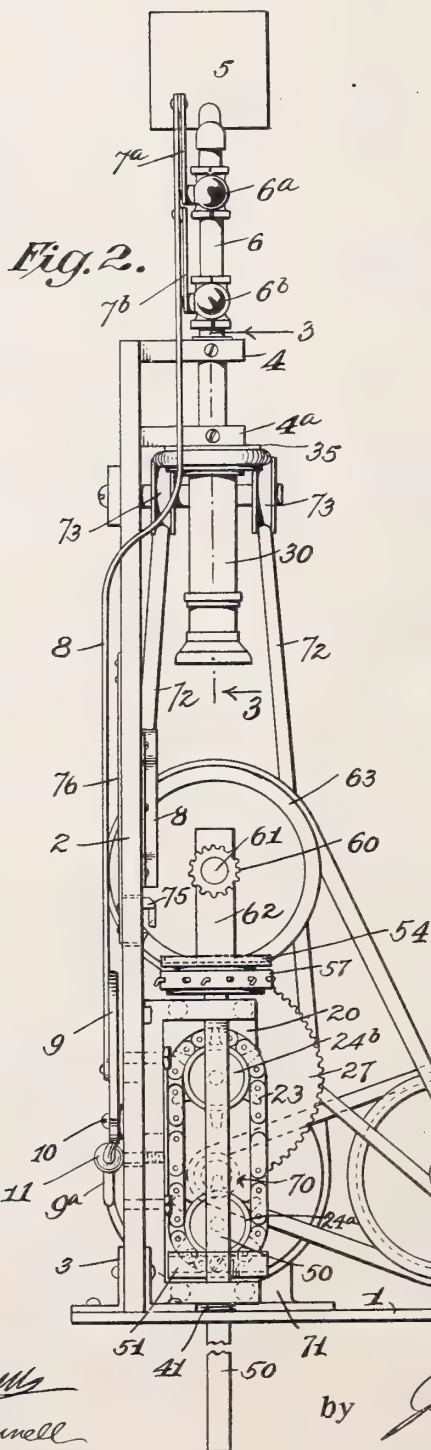
Inventor:
by *John N. Whitehouse*
E. Scherr & Atty

J. N. WHITEHOUSE.
MACHINE FOR MAKING SEAMLESS CELLULOID ARTICLES.
APPLICATION FILED APR. 25, 1912.

1,203,947.

Patented Nov. 7, 1916.

4 SHEETS—SHEET 2.



Attest:
Wm. J. Sullivan
Wm. J. Sullivan

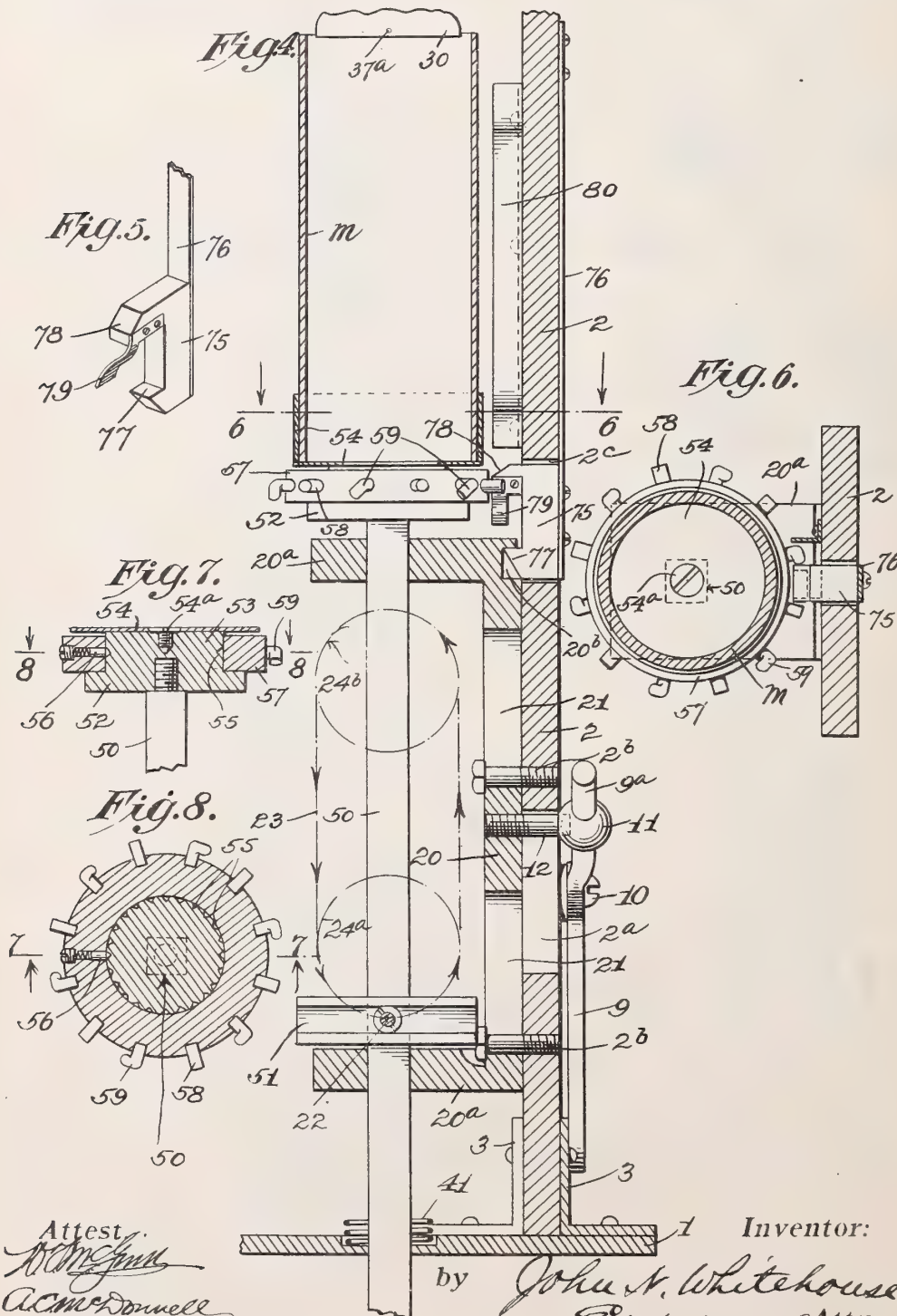
Inventor:
John N. Whitehouse
Ed. Schenck Atty

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4 SHEETS—SHEET 3.



Attest.
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Acme Donnell

Inventor:
by *John N. Whitehouse*
Ed. Scherr Atty

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4 SHEETS—SHEET 4.

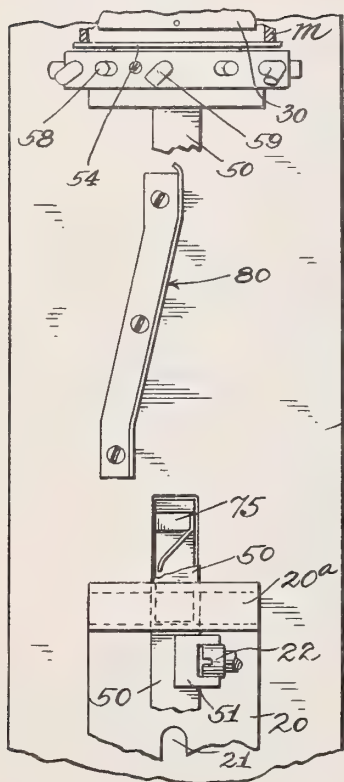


Fig. 9.

Fig. 10.

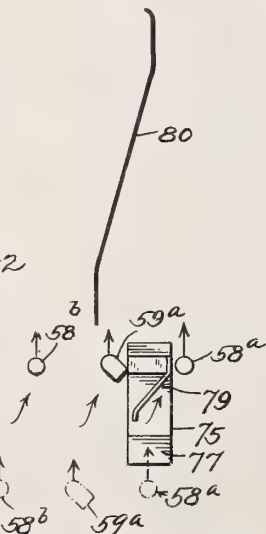


Fig. 11.

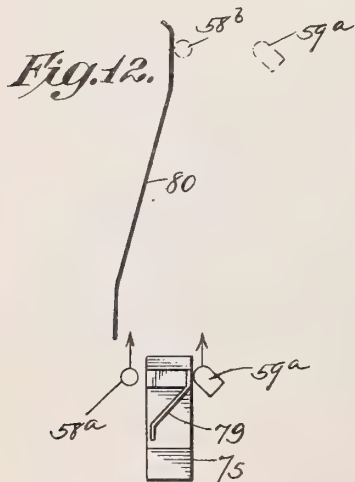
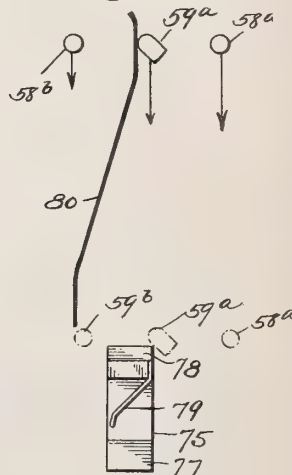


Fig. 12.

Fig. 13.

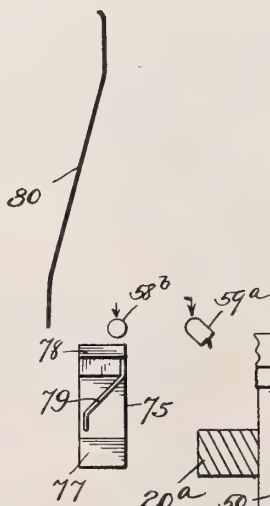
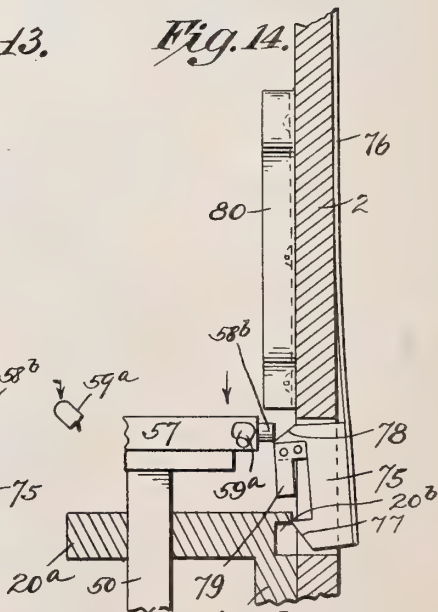


Fig. 14.



Attest:
W. M. Quinn
Atty. General

by *John N. Whitehouse*
Ed. Scherr Atty

UNITED STATES PATENT OFFICE.

JOHN N. WHITEHOUSE, OF NEWARK, NEW JERSEY.

MACHINE FOR MAKING SEAMLESS CELLULOID ARTICLES.

1,203,947.

Specification of Letters Patent.

Patented Nov. 7, 1916.

Application filed April 25, 1912. Serial No. 693,267.

To all whom it may concern:

Be it known that I, JOHN N. WHITEHOUSE, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Machines for Making Seamless Celluloid Articles, of which the following is a specification.

The object of my invention is to provide a machine for making seamless celluloid tubes and other articles; and further relates to a new product. The illustrated machine delivers a determined quantity of a quickly drying celluloid solution from a rotating jet or nozzle against the surface of a mold of the article to be formed, and said machine simultaneously reciprocates said mold to present its surface a determinable number of times for coating with the celluloid solution delivered from said nozzle, whereupon the machine automatically stops said reciprocations of the mold and simultaneously operates valve-means connected with the supply of the celluloid solution which measures off the right quantity of solution for use in the next operation of the machine.

The drawings illustrate only one of the particular embodiments which my invention is adapted to take.

In them, Figure 1 is a front elevation of a machine within my invention; Fig. 2 is a side elevation looking from the left of Fig. 1; Fig. 3 is a vertical section on an enlarged scale of the centrifugal distributing device taken on the line 3—3 of Fig. 2; Fig. 4 is an enlarged section taken on the line 4—4 of Fig. 1 but showing the carriage in its up or operating position; Fig. 5 is a detail perspective of the spring latch; Fig. 6 is a horizontal section on the line 6—6 of Fig. 4; Fig. 7 is a vertical section of the rotatable sleeve on the line 7—7 in Fig. 8; Fig. 8 is a horizontal section on the line 8—8 of Fig. 7; Fig. 9 is a detail front elevation of a portion of the machine showing the carriage and rotatable sleeve in their upper or operating position; Figs. 10 to 14 are diagrams illustrating the operation of the means for effecting two complete reciprocations of the mold and then unlocking the carriage and stopping further reciprocation of the mold.

I will now describe the specific devices shown in the drawings.

1 is a bed plate on which is mounted an

upright plate 2 secured thereto by angle irons 3. At the top of the plate 2 are secured two horizontal lugs 4 and 4^a which support a centrifugal distributing device 30 (Figs. 1 and 2, and compare Fig. 3).

Located above the machine is a tank 5 to hold the supply of celluloid solution. From the tank 5 extends a pipe 6 having two valves 6^a and 6^b whose ports are so arranged that when one valve is open the other is closed. The supply pipe 6 extends down into the bottom of the cylindrical casing or distributor 30 (Fig. 3). Levers 7 and 7^a connect the valves 6^a and 6^b to an upright connecting rod 8 which is attached to an operating handle 9 pivoted at 10 to the vertical plate 2. When the lever 9 is depressed by the operator to operate the machine, the upper valve 6^a is closed and the lower valve 6^b is opened to allow the quantity of the celluloid solution that was in the pipe 6 between the valves to flow down into the distributor 30. Vice versa, when the handle 9 is raised (which as will later appear occurs automatically in the operation of the machine), the lower valve 6^b is closed and the upper valve 6^a is opened, thereby permitting a fresh supply of solution to fill the pipe between the valves ready for delivery as aforesaid when the operator again depresses the handle 9.

The handle 9 has an extension 9^a which is slidably connected to a swivel knob 11 (compare Figs. 1 and 4) on the end of a pin 12 which projects through a vertical slot 2^a in the plate 2 from a vertically movable carriage 20. This carriage 20 (Fig. 4) is supported to permit its vertical adjustment on the plate 2 by means of stationary bolts 2^b screwed into said plate and projecting freely through vertical guide slots 21 in the carriage (compare Figs. 2 and 4).

The carriage 20 has two horizontal lugs 20^a perforated by square holes through which reciprocatingly passes a square sectioned rod 50 on which is mounted a horizontally grooved block 51 (Figs. 1 and 4) whose groove receives slidably into it the cylindrical head of a screw 22 on the face of a sprocket wheel 24^a rotatably mounted on the vertical side of the carriage 20 and connected by a sprocket chain 23 with a similarly mounted upper sprocket wheel 24^b. The shaft 25 of this upper sprocket wheel has a gear 27 (Fig. 1) on its other end beyond the vertical

side of the carriage 20 adapted to engage a pinion 60 on a shaft 61 which is journaled in a stationary frame 62 secured to the bed plate 1 of the machine. At the other end of the shaft 61 is secured a pulley 63 connected by a belt 64 to a pulley 65 on a shaft 66 mounted in a frame 67 secured to the bed plate 1. On the shaft 66 is further secured a pulley 68 connected by a belt 69 to a pulley 70 (Fig. 2) on the drive shaft of a motor 71 (Fig. 1). It is apparent from this arrangement that when the lever 9 is depressed the carriage 20 will be raised to carry its gear 27 into engagement with the constantly rotating pinion 60, whereupon the sprocket wheel 24^a will be driven and its crank pin 22 will reciprocate the square sectioned rod 50 up and down through the horizontal lugs 20^a of the carriage 20. A latch 77 supports the carriage 20 in its described elevated and operating position, best shown in Fig. 4, until said latch is automatically released to permit the carriage to drop as explained later.

52 is a disk which screws on the threaded upper end of the rod 50 (Fig. 7). This disk has a reduced portion 53, to the top of which is secured a cup-like platform 54 by a screw 54^a.

57 is a sleeve which rotatably surrounds said reduced portion 53. It has an inwardly directed spring-pressed, blunt-pointed pin 56 to cooperate with corresponding recesses 55 (Figs. 7 and 8) (twenty-four in number) around the periphery of the reduced portion 53. The outer periphery of the sleeve 57 carries six equally spaced apart straight pins 58 alternating with six bent or cam-headed pins 59.

M is a mold, in this case a hollow cylindrical metal tube which fits into the cup-like platform 54 so as to partake of the reciprocation of the rod 50. The upper end of the mold is open so as to receive into it the liquid celluloid-distributing device 30 when said mold reciprocates relative to said distributing device.

The purpose of the described rotatable sleeve 52 and its pins 58 and 59 is for the latter to cooperate with means now to be described for automatically stopping the reciprocation of the rod 50 and the supported mold M after a determined number of said reciprocations. Thus, 75 (compare Figs. 5, 4, etc.) is a latch on the end of a leaf spring 76 secured to the back of the vertical plate 2, said latch projecting through an opening 2^a in said plate. This member 75 has a beveled projection 77 for entering a recess 20^b in the upper part of the carriage 20 when the latter is lifted into its up position. The following features of the latch member 75 are part of the means for releasing said projection 77 from locking engagement to permit the carriage to

drop and thereby carry its gear 27 out of mesh with the constantly rotating pinion 60, and so stop further reciprocation of the rod 50 and of the supported mold. These features of said member 75 comprise the downwardly beveled upper projection 78 thereof and the inclined cam-strip 79 supported therefrom (compare Fig. 5). A further member taking part in this automatic release of the carriage 20 after the determined number of reciprocations of the mold is the cam-strip 80 (compare Figs. 1 and 2) mounted on the front face of the vertical plate 2 over the latch member 75.

Figs. 10 to 14 show diagrammatically the operation of this reciprocation-determining and carriage-releasing means. Figs. 10 to 13 inclusive are face views of the parts showing, however, only three of the pins in the different positions of vertical elevation into which they are carried by the reciprocation of the rod 50. Before lifting the carriage 20 into its elevated position, the sleeve 57 is rotated by hand so that one of its straight pins 58 is located under the cam-strip 79 of the latch member, as shown by the dotted lines 58^a representing said pin in Fig. 10. The carriage having been lifted, the rod 50 and therefore the mold immediately begins its first up stroke and said pin 58^a rides under and is cammed to the right by the strip 79 into the position shown by the full lines 58^a with corresponding rotation of the sleeve 57. Next, the bent pin 59^a engages the strip 80 and is cammed still further to the right into the position shown by the full lines 59^a in Fig. 11 at the top of the first up stroke of the mold.

It will be noted that this position is vertically over the right hand corner of the beveled projection 78 of the latch member 75 with the result that as the mold nears the completion of said downward reciprocation, said pin 59 strikes said corner of the latch member. However, its inclined head glances off said corner without pushing back and releasing the latch 75. This down stroke is then followed by another up stroke which, as indicated in Fig. 12, results in the next adjacent straight pin 58^b being cammed by the strip 80 into the same aforesaid vertical position over the corner of the latch 75. Finally, the fourth stroke occurs downwardly and this pin 58^b (because it has no inclined head) strikes down squarely on top of the beveled projection 78 of the latch 75, (see the side view of Fig. 14) and pushes it back to unlock the projection 77 from the carriage 20, whereupon the latter drops by its own weight (being cushioned by the spiral spring 41 in Fig. 4) and stops further reciprocation of the mold by disengaging the gear 27 from the pinion 60. At the same time, this drop of the carriage operates the valves as previously described to

close the bottom valve 6^b and open the upper valve 6^a to measure off a proper quantity of celluloid solution for use on the next operation of the machine by depressing the handle 9 to make another article.

It remains now to describe the distributing devices for delivering the liquid celluloid against the inside of the mold M.

31 (compare Fig. 3) is an inner tube secured in openings in the lugs 4 and 4^a by set screws 32. This tube is provided with an annular bearing ridge 33 and ball bearings 34 on which rotates an outer tube 36 having a pulley 35 at its upper end. This tube 36 has a bottom 37 in the form of a receptacle which screw-connects therewith. This bottom 37 is itself made up of two parts screwed together and has a small hole 37^a from which the celluloid solution is delivered centrifugally in a fine stream or jet when the tube 30 is rotated at high speed as hereinafter described.

Lubrication is provided for the described bearings by an oil hole 4^b (Fig. 3) which leads to the ball bearings 34, whence the oil can deliver to the bearing ridges 33 and from them into the annular tray 38 secured on the inside of the tube 36, whence it is carried through a hole 40 to an outer tray 39. The celluloid solution supply-pipe 6 extends down into the bottom 37 of the rotating tube 30. This tube 30 is rotated at high speed by means of a belt 32 which encircles the pulley 35, thence to guide pulley 73 and then over a larger pulley 74 on the motor 71.

The operation of the machine will be apparent from the foregoing description. A mold M is mounted upon the platform 54 and the carriage 20 is raised and latched in its up position by depressing the operating handle 9. This acts upon the valve means 6^a and 6^b to measure off and deliver a quantity of celluloid solution down the pipe 6 into the bottom 37 of the rotating tube 30. At the same time it also brings the gear 27 into mesh with the rotating pinion 60 and starts the rod 50 and the supported mold to reciprocate. The length of the reciprocating stroke is such that the jet of liquid celluloid thrown from the opening 37^a is caused to cover the inside of the mold. The pins 58 and 59 acting in conjunction with the related means cause the particular machine shown to make four complete strokes or reciprocations with the result that four successive layers of celluloid solution are applied to the inside of the mold, whereupon it is arranged that the celluloid solution in the bottom of the tube 30 shall have been used up and the reciprocations are automatically stopped concurrent with the automatic release or unlatching of the carriage 20 which, in dropping, elevates the handle 9 and again operates the valve means 6^a

and 6^b preparatory to measuring off a fresh quantity of celluloid solution for use in making the next article.

The successive layers of celluloid solution applied as above to the surface of the mold quickly set and give as a result a seamless article, in this case a cylindrical tube. If greater thickness is desired for the article than four layers, then the above operation can be repeated to deposit four more layers, etc. If desired, the mold may be reversed end for end in the supporting cup 54 between each operation of the machine. When all the layers desired have been deposited, the celluloid tube by its own shrinkage separates itself from the mold and can be withdrawn. An important use of these seamless celluloid tubes is to support them on a suitable cylindrical core and use them for phonograph records. For this purpose the wall of the celluloid tube may be about tenths of an inch thick. The sound record may be impressed thereon before the tube is put upon said cylindrical core. Another way is to form the inside of the mold M with the reverse of the sound waves of the finished record, and then to jet or impact the celluloid solution against this surface. When the resulting tube separates from this mold or matrix, it leaves a very perfect representation of the sound waves thereon.

The aforesaid straight and bent pins may be interchanged to vary the number of strokes of the mold. Thus, four strokes are obtained when the straight and bent pins merely alternate as in the machine illustrated. However, if two bent pins intervene between the two straight ones, then the machine will make six strokes. If still another intervene, then the machine will make two additional strokes, and so on.

I get good results by operating the distributor 30, or rather its outer tube 36, at about five thousand revolutions per minute. This throws the celluloid solution centrifugally with considerable force against the inside of the mold and follows this by impacting the layers hard on top of one another. The result is to give a celluloid which is denser than if it had been merely flowed on without impact or pressure; and said resulting celluloid has other desirable qualities that make it a superior material for sound records.

The fact that the celluloid solution is forced violently from the orifice 37^a by pressure behind it permits said orifice to be much smaller than if the solution merely flowed by gravity from an orifice upon the surface of the mold. This means that the respective layers applied by the jet are thinner than those which could be flowed on. This in turn means that the thin layers remain to a maximum extent uniformly distributed

at an even depth all over the mold, whereas the thicker flowed-on layers do not, but continue to flow and produce unevenness and inequalities in the layer when dry.

5 The celluloid solution which I use is relatively thin and I filter it so as to eliminate particles which would interfere with the needle in sound reproduction. The tube being dense, homogeneous and entirely seamless, is an excellent material to record and reproduce sound waves.

The described process and machine may possibly be practised and used to produce other than celluloid materials. For example, 15 a solution of wax or other suitable material might be substituted for the celluloid solution; and the claims for said process and machine are to be read accordingly as extending to such equivalent uses of the foregoing inventive ideas.

What I claim is:

1. A machine for making seamless celluloid articles which comprises in combination a mold, a jet which delivers celluloid solution against said mold, means for relatively rotating the mold and the jet and means for automatically reciprocating said mold and jet relatively to each other a number of times to cause the jet to cover the surface of the mold.

2. A machine for making seamless celluloid articles comprising in combination a hollow mold, a jet receivable into said mold for delivering celluloid solution against its interior, said jet and mold being relatively rotatable, and means for automatically reciprocating said mold and jet relatively to each other a number of times to cause the jet to cover the surface of the mold.

3. A machine for making seamless celluloid articles which comprises in combination a mold, a rotating jet which delivers celluloid solution against said mold, and means for reciprocating said mold and jet relatively to each other to cause the jet to cover the surface of the mold, and means which automatically stops said reciprocations after a determined number thereof has occurred.

4. A machine for making seamless celluloid articles comprising in combination a hollow mold, a rotating jet receivable into said mold for delivering celluloid solution

against its interior, means for reciprocating said mold and jet relatively to each other to cause the jet to cover the surface of the mold, and means which automatically stops said reciprocations after a determined number thereof has occurred.

5. A machine for making seamless celluloid articles which comprises in combination a mold, a rotating jet which delivers celluloid solution against said mold, means for reciprocating said mold and jet relatively to each other to cause the jet to cover the surface of the mold, and means for automatically dividing off the supply of celluloid solution so that the jet delivers a quantity thereof proportionate to each article.

6. A machine for making seamless celluloid articles comprising in combination a hollow mold, a rotating jet receivable into said mold for delivering celluloid solution against its interior, means for reciprocating said mold and jet relatively to each other to cause the jet to cover the surface of the mold, and means for automatically dividing off the supply of celluloid solution so that the jet delivers a quantity thereof proportionate to each article.

7. The combination with an elongated mold having an open end, of a jet receivable into the mold through said open end, said mold and jet being relatively movable longitudinally of the mold, means for automatically effecting a relative rotation between the jet and mold, and means for effecting a number of relative longitudinal movements between the mold and jet.

8. In a machine of the character set forth, the combination with a mold, of a jet receivable thereinto, said mold and jet being relatively reciprocable and said jet having a discharge orifice extending solely in a direction transverse to the direction of relative reciprocation of the mold and jet, and means for effecting a plurality of such relative reciprocations and means for effecting a relative rotation of the mold and jet.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN N. WHITEHOUSE.

Witnesses:

E. W. SCHERR, Jr.,

A. C. McDONNELL.

APPARATUS FOR PREPARING COMBINED CINEMATOGRAPHIC
AND PHONOGRAPHIC RECORDS,

#1,204,091-----K. Von Madaler,

Patented-November 7th, 1916.

Filed-October 14th, 1911.

K. VON MADALER.
 APPARATUS FOR PREPARING COMBINED CINEMATOGRAPHIC AND PHONOGRAPHIC RECORDS.
 APPLICATION FILED OCT. 14, 1911.

1,204,091.

Patented Nov. 7, 1916.

2 SHEETS—SHEET 1.

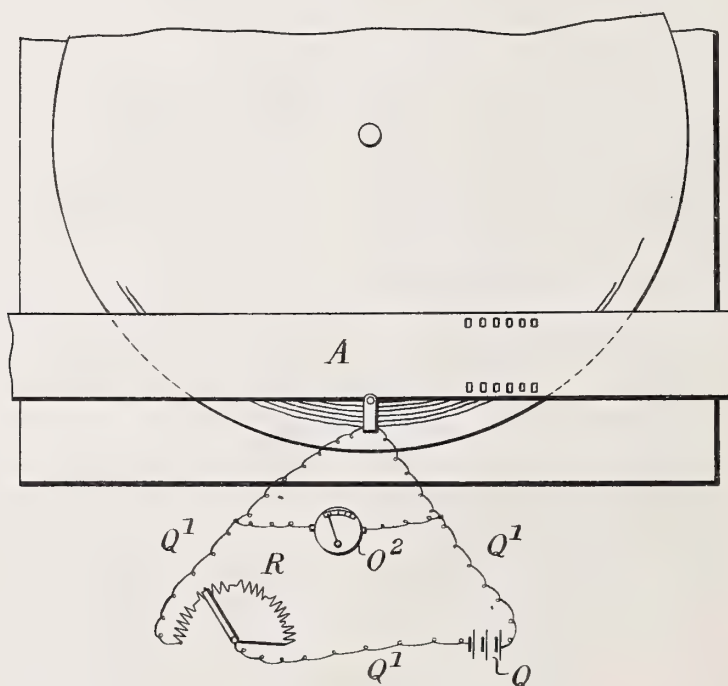


Fig. 1.

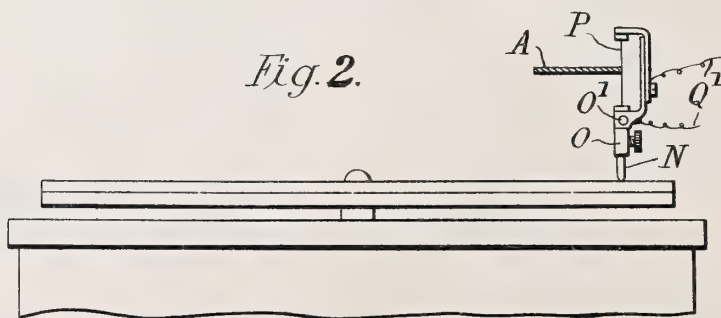


Fig. 2.

Witnesses.
Klaus Matthei
Oscar W. Helwig

Inventor,
K. von Madaler
G. Wilkinson, Fisher & Wetherstone
Attorneys

K. VON MADALER.

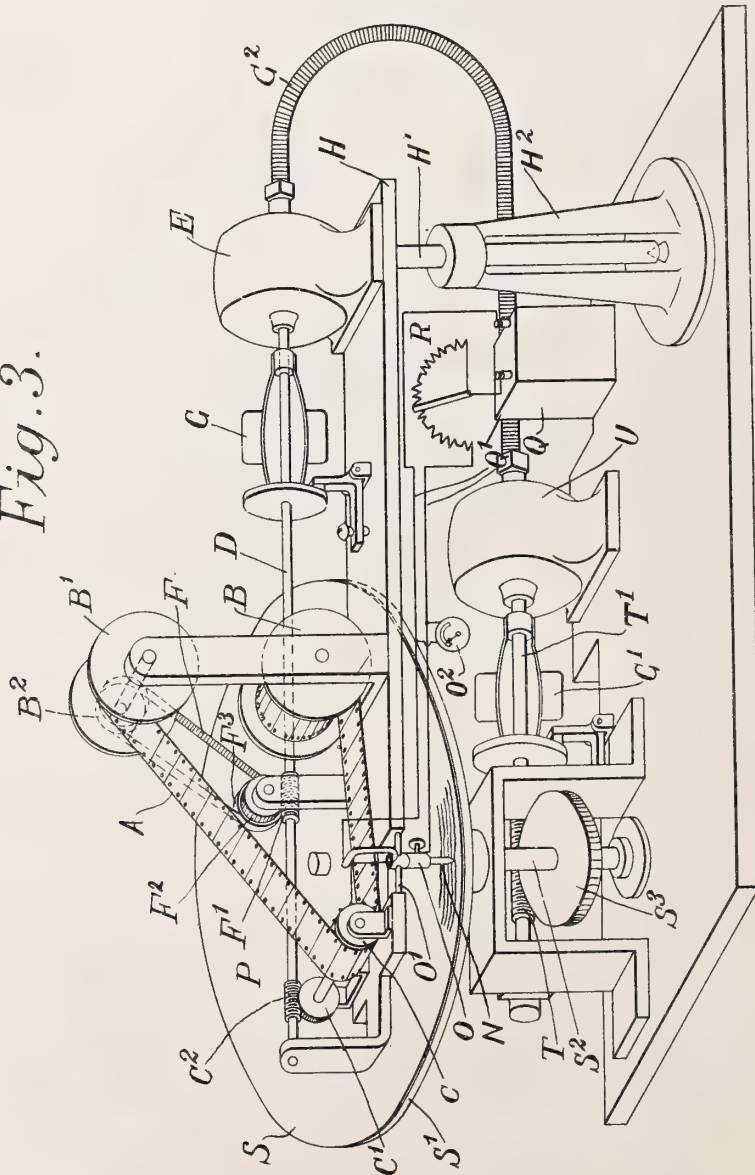
APPARATUS FOR PREPARING COMBINED CINEMATOGRAPHIC AND PHONOGRAPHIC RECORDS.
APPLICATION FILED OCT. 14, 1911.

1,204,091.

Patented Nov. 7, 1916.

2 SHEETS—SHEET 2.

Fig. 3.



WITNESSES.

David M. Hutton.

H. W. Primmer

INVENTOR.

Katharina von Madaler

E. Wilkinson Ginter & Co. Attorneys

UNITED STATES PATENT OFFICE.

KATHARINA von MADALER, OF WEST DRAYTON, ENGLAND, ASSIGNOR TO PROJECTO-PHONE COMPANY INC., A CORPORATION OF NEW YORK.

APPARATUS FOR PREPARING COMBINED CINEMATOGRAPHIC AND PHONOGRAPHIC RECORDS.

1,204,091.

Specification of Letters Patent.

Patented Nov. 7, 1916.

Application filed October 14, 1911. Serial No. 654,774.

To all whom it may concern:

Be it known that I, KATHARINA VON MADALER, a subject of His Majesty the King of Hungary, and residing at West Drayton, England, have invented a certain new and useful Improvement in Apparatus for Preparing Combined Cinematographic and Phonographic Records, of which the following is a specification.

10 This invention relates to apparatus for preparing a record whereby to produce simultaneously the visible and audible elements of an event or series of events in a manner successfully to create the illusion of
15 witnessing such actual event or events themselves. It has been proposed to do this by using the usual moving picture camera and a phonograph at the same time to form separate records of the visible and audible
20 elements of the event or scene to be preserved or reproduced; and, in order to insure synchronism in due order of the respective records, various complicated synchronizing means have been proposed to be
25 used in the reproducing apparatus. This mode of procedure is open to certain obvious disadvantages, and particularly to the delicacy and uncertainty of all synchronizing means. I have invented a simple apparatus
30 for producing the double illusion above mentioned without employing synchronizing apparatus during reproduction. At the same time I secure a rigid synchronizing of the two records, which never needs adjust-
35 ment and is always reliable.

My invention involves a variety of features, some of which are described and claimed in divisions of this application, namely in my applications Serial Numbers
40 17,676, 17,677 and 17,678, all filed March 29th, 1915. In all of these the end had in view is to reproduce the desired views and sounds from a single transparent or translucent film carrying the positive photo-
45 graphs in due order of successive instantaneous phases of the desired visible scene, together with the record on the same film of the corresponding audible elements thereof. The respective parts of the sound record
50 occupy a uniform spacial relation with re-

spect to the corresponding individual views, whereby synchronism is preserved at all times.

The film itself as finally produced, and the method or process employed to produce 55 it are set forth and claimed in certain other divisions of this application.

In order that the invention may be readily understood reference is made to the accompanying drawings which illustrate dia- 60 grammatically one embodiment of it, and in which:

Figure 1 is a plan of part of an apparatus for reproducing the sound curves or grooves of a disk sound record onto the edge of a 65 film. Fig. 2 is an elevation of same partly in section and Fig. 3 is a perspective view of the apparatus as a whole.

The record S (shown as a disk record but not essentially such) is supposed to have 70 been made in the usual manner during occurrence of the actual events or scenes to be reproduced; and the cinematograph or moving picture film A is the usual succession of positive photographs representing 75 successive instantaneous phases of the visible elements of such events or scenes. These records having been prepared in any manner, my invention involves the production of a rigidly synchronized record capable of 80 use for reproduction by copying on the film itself—and preferably, as shown, on the edge of the same—the sound record on the disk S; and so placing it that there shall be a substantially uniform spacial relation 85 between each picture on the film and the corresponding part of the sound record. One method and apparatus for this purpose is operated as follows: Referring to the drawings A represents a cinematograph film 90 which is adapted to be unwound from a spool or bobbin B onto another spool B'. The film is carried over a driving sprocket drum C the spindle of which carries a worm wheel C' that gears with a worm C² on a 95 driving shaft D driven by a motor E. The bobbin b' is driven from the shaft D by means of a spiral spring belt F through the medium of a worm F' on the shaft D, worm wheel F², pulley F³ and pulley B². A speed 100

governor G of well known construction is mounted on the shaft D to control the speed of same. All of the aforementioned parts are carried by a swinging arm H mounted
 5 on a vertical shaft H² supported in a bearing bracket H². A needle N or sapphire is removably held in a holder O which is pivoted to the arm H at O'. The upper portion of this holder is in the form of a yoke
 10 and has a platinum wire P stretched between the two arms thereof. This platinum wire is adapted to be heated to a dull red heat by means of an electric current from a battery Q through the wires Q'. A volt
 15 meter O² and an adjustable resistance R are introduced into the circuit for the purpose of maintaining a constant current in the circuit and consequently a uniform heat in the platinum wire P.

20 The needle N is adapted to rest in the sound groove of a disk record S which is carried by a turntable S'. The turntable S' is mounted on a vertical spindle S² on which is a worm wheel S³ that gears with a worm
 25 T on a driving shaft T' driven by a motor U. A governor G' is provided on the shaft T' to regulate or control the speed of the latter.

The operation of the apparatus is as follows: Having placed the film in the position shown in Fig. 3 and the disk record on the turntable with the needle engaging the sound groove thereof, the motors E, U are set in motion and the current turned on in
 35 the circuit Q'. The result will be that the film is moved past the wire P with its edge in contact therewith and the wire will vibrate in accordance with the sound grooves of the disk record. The arm H will travel
 40 toward the center of the disk record in a similar manner to that of the sound arm of a gramophone. It will therefore be seen that the wire P will burn or melt the edge of the film and thereby reproduce the sound
 45 curves of the disk record onto the edge of the film.

The governors G G' control the speed of the motors E, U, which are coupled together by a flexible shaft G² so that the film A and
 50 the record S are driven at the same speed to produce a sound record on the film which will be in synchronism with the pictures on the latter.

It is the practice, when ordinary films are
 55 employed, to cut out damaged pictures and join the ends of the film again without replacing the pictures, the defect thus produced being hardly perceptible. This, however, would not be possible if films having
 60 a sound record thereon are employed because any break in the sound record would be most objectionable. If therefore it becomes necessary to remove some of the pictures, on account of their damaged condition, those
 65 parts of the film that are removed must be

replaced by new portions exactly similar to the parts removed. In order to facilitate the replacing of damaged parts in the film the pictures are preferably numbered. This may be done automatically when taking the
 70 pictures or the sound record.

When a ribbon has been suitably prepared in this manner, it may be run through a suitable cinematographic display machine, while the edge is made to act upon a suitably
 75 placed phonographic reproducing apparatus. These features are shown, described and claimed in a division of the present application (Serial No. 17678) and need no further discussion here.

It is obvious that the copying may be carried out on both edges of the film if desired. By this means a film record is produced by means of which the sound can be
 85 much increased without such a straining of a single diaphragm in a single reproducer as would tend to impair the quality of the tone produced.

My invention may be embodied in a variety of apparatus or in modified methods
 90 and records, and I do not limit myself to the details herein shown and described.

What I claim is:—

1. Apparatus for copying upon a ribbon a phonographic record from a master record,
 95 comprising in combination a wire suitably mounted with relation to said master record, means for heating said wire and means for causing said ribbon to move past said wire with its edge in contact therewith.

2. Apparatus for copying upon a ribbon, a phonographic record from a master record comprising in combination means for causing appropriate longitudinal travel of said ribbon, a support therefor adapted to permit proper movement of said means to follow the line of undulations in said record, a stylus suitably mounted, a wire so connected with said stylus as to vibrate with it, and means for electrically heating said wire.

3. The combination of means for supporting a ribbon, a sound record, a stylus in contact with the sound grooves in said record, a pivotally mounted wire attached to said stylus, means for heating said wire, means
 115 for rotating said record and means for moving said ribbon past said wire with an edge in contact therewith.

4. The combination of a flat phonograph record, a support adapted to swing over and parallel with it, ribbon carrying means mounted on said support, a vibratory wire also on said support and adapted to be vibrated by said phonograph record, means
 120 for driving said phonograph record, and means for moving the ribbon past said wire and in contact therewith.

5. The combination of means for supporting a cinematograph film, a sound record, a needle in contact with the sound grooves
 130

on said record, a holder for said needle said
holder being pivotally mounted, a wire sup-
ported by said holder, means for heating
said wire, means for rotating said record
5 and means for moving said film past the
wire with an edge of the film in contact
with said wire.

In witness whereof I have hereunto set my
hand in the presence of the two subscribing
witnesses.

KATHARINA VON MADALER.

Witnesses:

G. CRUESEMANN,
R. WESTACOTT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

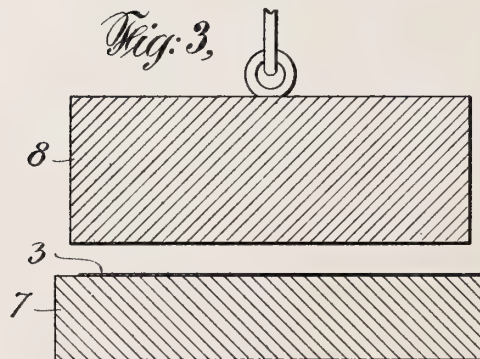
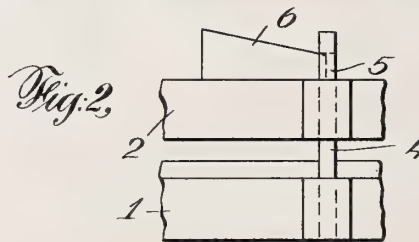
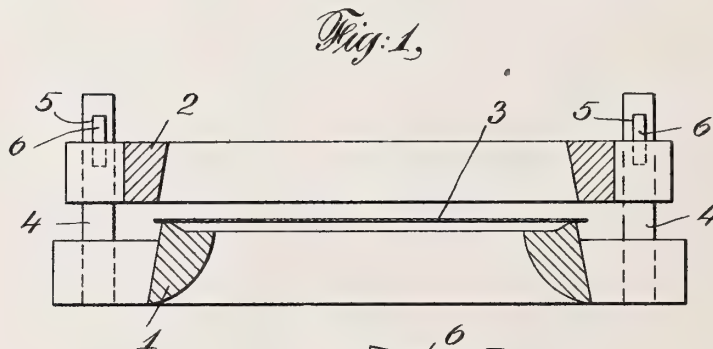
METAL SHEET FOR ACOUSTIC PURPOSES
AND METHOD OF MAKING SAME,

#1,204,096-----P. A. Waller,
Patented-November 7th, 1916.
Filed-October 26th, 1912.

P. A. WALLER.
METAL SHEET FOR ACOUSTIC PURPOSES AND METHOD OF MAKING SAME.
APPLICATION FILED OCT. 26, 1912.

1,204,096.

Patented Nov. 7, 1916.



Witnesses:
Max B. A. Doring
May J. Trumble

Inventor
P. A. Waller
By his Attorneys
Marble & Matta

UNITED STATES PATENT OFFICE.

PER ARON WALLER, OF STOCKHOLM, SWEDEN, ASSIGNOR TO CARL RICHARD WALLER,
OF TRENTON, NEW JERSEY.

METAL SHEET FOR ACOUSTIC PURPOSES AND METHOD OF MAKING SAME.

1,204,096.

Specification of Letters Patent.

Patented Nov. 7, 1916.

Application filed October 26, 1912. Serial No. 727,972.

To all whom it may concern:

Be it known that I, PER ARON WALLER, a subject of the King of Sweden, and a resident of Stockholm, Sweden, have invented certain new and useful Improvements in Metal Sheets for Acoustic Purposes and Methods of Making Same, of which the following is a specification.

My invention relates to improvements in methods of treating sheet steel to be used as sounding boards of pianos, as membranes or diaphragms of telephone microphones, and the like, and comprises the heating of a steel plate to a suitable temperature as hereinafter described, the clamping of such plate, while heated, in such manner that the plate is of necessity stretched during the ensuing cooling, and then the cooling of the plate and consequent stretching thereof beyond the elastic limit of the metal.

My invention further comprises the heating of steel or other metal or alloy to a temperature above the critical point of transformation of such metal or alloy, and the cooling of such metal while the metal is held against contraction. And my invention comprises as well the sounding boards for pianos, and the membranes or diaphragms of telephone microphones, and the like, resulting from such methods of treatment, said sounding boards and membranes, diaphragms, etc., having superior acoustic properties and being made of steel or other metal which has been stretched to beyond its elastic limit *e. g.* by the method indicated.

The object of my invention is to improve the acoustic properties of sheet steel and other metals designed to be used for the sounding boards of pianos and other musical instruments, or for the diaphragms or membranes of telephone microphones, and for other purposes.

In the accompanying drawings I illustrate more or less diagrammatically two forms of such apparatus which may be used in the stretching of steel plates in the carrying out of my process.

In said drawings: Figure 1 shows a transverse vertical section of one such form of apparatus, the view also showing a plate to be stretched in position in the apparatus. Fig. 2 shows a detail fragmentary side view of the two frames shown in Fig. 1, illustrating the use of wedges for holding the frames

together. Fig. 3 shows a transverse vertical section of an alternative form of apparatus, this view also showing a plate to be stretched in position in the apparatus. Fig. 4 is a detail fragmentary sectional view of one of the blocks 7 and 8 of Fig. 3, illustrating on a greatly enlarged scale the roughening of the surface of such block.

Sheet metal which is to be used to amplify sound, as, for example, sheet metal which is to be used as the sounding board of a piano, or as a diaphragm or membrane of a telephone microphone, must be homogeneous, must have an absolutely flat surface, and must have high elasticity. Homogeneous metal is required, in order that sound waves may be amplified evenly, and in order that the sound may be clear, and that the tone may possess fullness and beauty. An absolute flat surface is necessary in order that the vibrations may be uniform, and in order that no additional means may be required to make the surface flat and true. A high elastic limit of the metal is necessary in order that this elastic limit may not be exceeded when the plate is put under the stress to which it is necessarily subject in use. Sheet steel possessing these qualities cannot be produced by ordinary rolling or forging processes, or by any other mechanical means known to me.

I have found that if a piece of sheet steel be heated, to a temperature such that, if the metal when so heated be held against contraction, the metal during cooling is stretched beyond its elastic limit; and if the metal so heated be secured against contraction and allowed to cool, so stretching it beyond its elastic limit, this steel sheet, when removed from the stretching apparatus, and when cold, retains the shape and the absolute flat surface acquired in such stretching apparatus, and the metal has been rendered homogeneous and has had its elastic limit raised. By this process of stretching, any internal stresses in the sheet are equalized, and therefore the metal is brought to a uniform condition, such that its vibrations due to sounds are uniform (whereas the vibrations in a sheet of steel not so treated are apt to be very irregular); and such a sheet of steel may then be used as a sounding board of a piano, or as the diaphragm or membrane of a telephone mi-

crophone, and when so used will produce true, full sounds, clear in tone and of a timbre superior to that produced by the aid of wooden and other sounding boards.

5 Referring to Fig. 1, showing one form of apparatus which may be employed in the stretching of the metal, numerals 1 and 2 designate two frames, frame 2 being so shaped that, when pressed against frame 1, the sheet of metal 3 between these frames is pinched at the edges and so is held against contraction. These frames 1 and 2 may be special stretching frames, or may together constitute the sounding board frame of a piano or other musical instrument. Various means may be employed for holding the two frames together. I have indicated for the purpose bolts 4, secured to the under frame 1 and passing through apertures in the upper frame 2, and provided above frame 2, with openings 5 adapted to receive wedges 6, (Fig. 2), which wedges, when driven into place, clamp the two frames together so tightly that contraction of the metal 3 is precluded.

15 In the alternative apparatus illustrated in Fig. 3, 7 designates an anvil block having a flat upper surface, and 8 designates an upper block having a flat lower surface. Block 8 may have such weight that when it is pressing the sheet metal 3 against the top of anvil block 7, contraction of the sheet 3 is precluded by the mere weight of block 8 and by the surface friction of the sheet 3 against the surfaces of the anvil block 7 and upper block 8; or, the surfaces of these two blocks 7 and 8 may be slightly roughened. In practice the roughening is very slight and may be only that produced by ordinary tools (a planer tool for example) in machining the surfaces of the two blocks. Such roughness is too slight to appear in the drawings without exaggeration, and accordingly in Fig. 4, an enlarged and exaggerated section is illustrated, but such slight roughness is nevertheless very effective in precluding contraction of the sheet metal held by the said blocks.

25 The rate of contraction of steel in cooling between definite temperature limits is well known, and therefore it is easy to calculate the temperature to which a sheet of steel must be heated in order that, after such steel has been so heated and is clamped in either the apparatus shown in Fig. 1 or in the apparatus shown in Fig. 3, it may be stretched beyond its elastic limit (the elastic limit of steels of different composition being well known, or, if not known, being easy to determine by well known methods) during the resulting cooling. In carrying out my process therefore, I take a sheet of steel 3, of suitable dimensions, and heat it to a temperature previously determined as such that, when the sheet cools, while held against con-

traction, it will be stretched beyond the elastic limit; and I then place such sheet of steel in either the apparatus shown in Fig. 1, or the apparatus shown in Fig. 3, and immediately clamp the sheet firmly and permit it to cool.

It will be seen that by the apparatus of Figs. 1 and 2 the metal will be stretched longitudinally, while by the apparatus of Fig. 3 it will be stretched both longitudinally and laterally.

In practice, I have attained excellent results with steel of from .35 to .40 per cent. carbon, and with thickness varying from .6 mm. to 1. mm. Such steel was ordinary good carbon steel, free from hardening substances, such as chrome; though I do not preclude the treatment by my process of the various alloy steels, such as tungsten steel, chrome steel, titanium steel, nickel steel, etc., but to the contrary contemplate the treatment of such steels by my process.

As a special feature of my process, though not in all cases a necessary feature, I include the heating of the steel and other metals and alloys, not only to a point such that the metal will be stretched beyond the elastic limit when cooled while held against contraction, but to a point beyond the critical point of transformation of the metal. It is well known that steel and other metals and alloys when heated beyond a certain temperature (this temperature varying with different grades of steel and other metals, but being well known or easily determined by well known methods, for each particular grade) undergoes a change of crystalline structure; and that when such steel or other metal, after being so heated, beyond the critical point of transformation, is cooled, it has acquired and retains permanently a new crystalline structure, characterized, usually, not only by greater hardness, but also by greater elasticity. I have found that this heat treatment of metal to be used for sounding boards, etc., viz:—the heating of the metal to beyond its critical point of transformation, before the metal is placed in the stretching apparatus, and then the cooling of the metal in the stretching apparatus while such metal is held against contraction, is particularly advantageous for metal to be used as sounding boards, microphone diaphragms, etc.

The apparatus shown in Fig. 3 has been found to be particularly suitable for use when treating steel which has been heated above the critical point of transformation; for the heated steel is cooled rapidly by its intimate contact with the two cool metal bodies 7 and 8, the mass of which is so great, relative to that of the steel sheet 3, that heat is absorbed from such steel sheet very much as heat would be absorbed if the sheet were dipped in water or other hardening liquid.

By this means the steel plate is hardened or tempered, and its elastic limit greatly raised.

As a particular illustration of the temperatures to which steel may be heated to advantage, when of from .35 to .40 per cent. carbon, for treatment according to my invention, I will state that where heating beyond the critical point of transformation is not desired, heating to from 350° to 400° centigrade has proved effective; and when heating beyond the critical point of transformation is desired, heating to from 800° to 900° centigrade will give good results. But it is to be understood that these temperatures are not constant for all grades of steel but may be varied according to the nature of the metal treated.

What I claim is:—

1. The herein described method of treating sheet steel to be used for sounding boards and the like, which comprises heating the steel sheet to a temperature such that, when cooled while held against contraction, it is stretched beyond its elastic limit, and then holding along its edges the steel sheet so heated and permitting it to cool, and thereby stretching the steel beyond its elastic limit.

2. The herein described method of treating sheet metal to be used for sounding boards and the like, which comprises heating the metal sheet to a temperature above its critical point of transformation, and then holding along its edges the metal sheet against contraction and permitting it to cool.

3. The herein described method of treating metal to be used for sounding boards and the like, which comprises heating the metal to a temperature above its critical point of transformation, and then clamping the metal between the surfaces of metal bodies having high heat absorption capacity, and permitting the heated metal to cool while so held.

4. The process of treating flat sheets of metal to remove unevennesses therefrom which comprises stretching said sheets longitudinally to beyond the elastic limit of the metal while in a heated condition.

5. The process of treating flat sheets of metal to remove unevennesses therefrom which comprises stretching said sheets both laterally and longitudinally to beyond the elastic limit of the metal while in a heated condition.

6. The process of treating flat sheets of metal to remove unevennesses therefrom which comprises stretching said sheets longitudinally to beyond the elastic limit of the metal by cooling said metal sheets from a heated condition without longitudinal contraction.

7. The process of treating flat sheets of metal to remove unevennesses therefrom

which comprises stretching said sheets both laterally and longitudinally to beyond the elastic limit of the metal by cooling said metal sheets from a heated condition without lateral and longitudinal contraction.

8. As a new article of manufacture a metal sheet for acoustic purposes of metal stretched to beyond its elastic limit.

9. As a new article of manufacture a sounding board of steel stretched to beyond its elastic limit.

10. As a new article of manufacture a flat metal sheet for acoustic purposes of metal stretched to beyond its elastic limit, said sheet being homogeneous and of high elasticity, and having the characteristics of metal stretched to beyond its elastic limit by cooling without contraction.

11. As a new article of manufacture a sounding board of steel stretched to beyond its elastic limit, said sounding board being homogeneous and having flat surfaces and high elasticity, and having the characteristics of metal stretched to beyond its elastic limit by cooling without contraction.

12. As a new article of manufacture a metal sheet for acoustic purposes of metal stretched longitudinally to beyond its elastic limit.

13. As a new article of manufacture a metal sheet for acoustic purposes of metal stretched longitudinally and laterally to beyond its elastic limit.

14. As a new article of manufacture a sounding board of steel stretched longitudinally to beyond its elastic limit.

15. As a new article of manufacture a sounding board of steel stretched longitudinally and laterally to beyond its elastic limit.

16. As a new article of manufacture a metal sheet for acoustic purposes having a thickness of less than 1 mm. and made up of metal stretched to beyond its elastic limit.

17. As a new article of manufacture a sounding board having a thickness of about .6 mm. to 1. mm. and made up of steel stretched to beyond its elastic limit.

18. As a new article of manufacture a metal sheet for acoustic purposes having a thickness of less than 1 mm. and made up of metal stretched longitudinally and laterally to beyond its elastic limit.

19. As a new article of manufacture a sounding board having a thickness of about .6 mm. to 1. mm. and made up of steel stretched longitudinally and laterally to beyond its elastic limit.

20. As a new article of manufacture a sounding board having a thickness of about .6 mm. to 1. mm. and made up of steel stretched to beyond its elastic limit, said sounding board being homogeneous and having flat surfaces and high elasticity, and

having the characteristics of metal stretched to beyond its elastic limit by cooling without contraction.

21. The process of producing metal sounding boards for pianos having superior acoustic properties which comprises clamping such metal sounding board, while in a highly heated condition, in the sounding board frame of such piano, and thereafter stretching the metal of such sounding board

to beyond its elastic limit by cooling without contraction.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

PER ARON WALLER.

Witnesses:

GRETA PRIM,

FR. N. BLOMQUIST.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND BOX,

#1,204,197-----L. K. Scotford,
Patented-Nov. 7th, 1916.
Filed-April 30th, 1915.

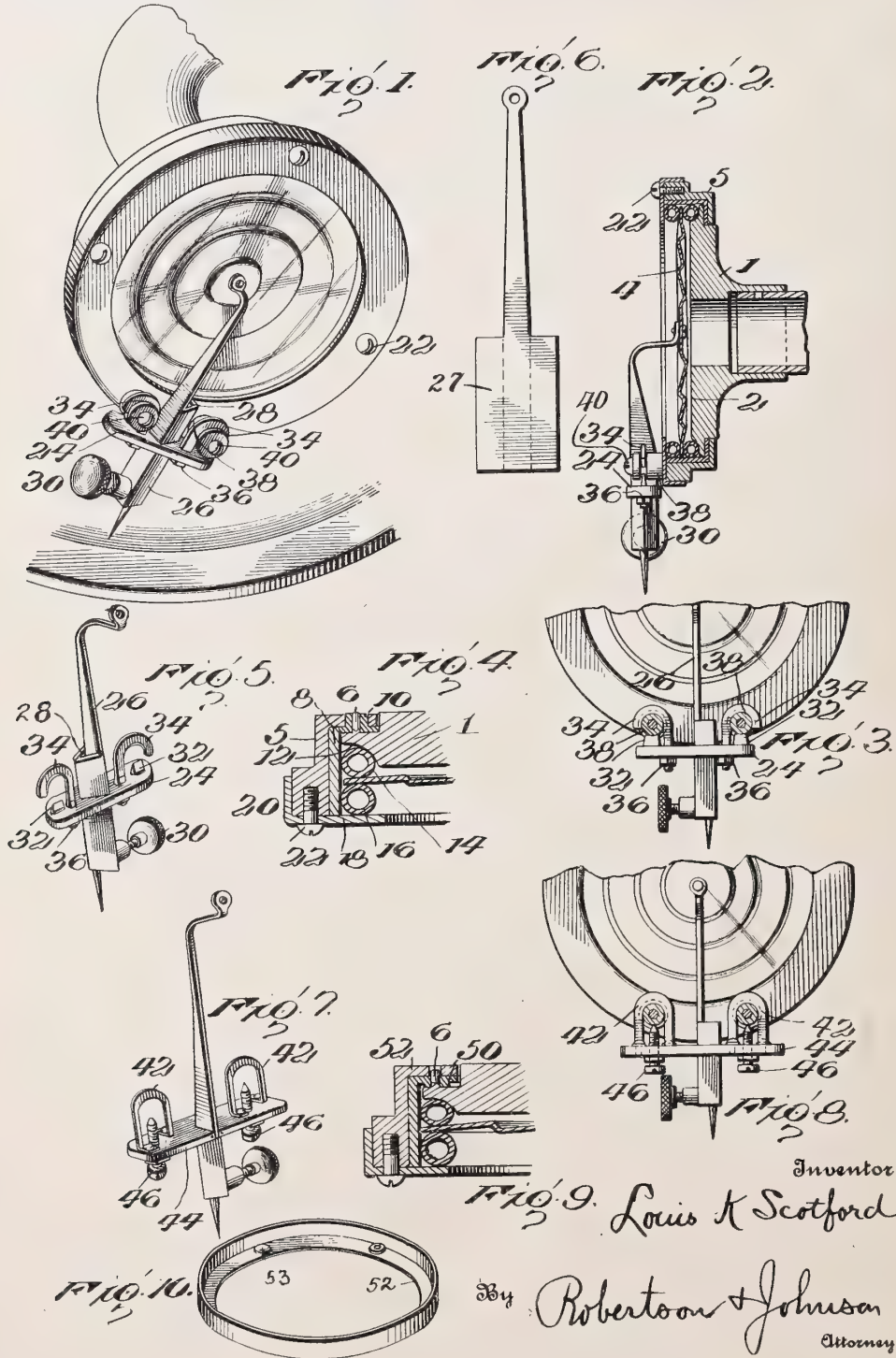
L. K. SCOTFORD.

SOUND BOX.

APPLICATION FILED APR. 30, 1915.

1,204,197.

Patented Nov. 7, 1916.



Inventor

Louis K. Scotford

By

Robertson & Johnson

Attorneys

UNITED STATES PATENT OFFICE.

LOUIS K. SCOTFORD, OF CHICAGO, ILLINOIS.

SOUND-BOX.

1,204,197.

Specification of Letters Patent.

Patented Nov. 7, 1916.

Application filed April 30, 1915. Serial No. 24,991.

To all whom it may concern:

Be it known that I, LOUIS K. SCOTFORD, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sound Boxes, of which the following is a specification.

This invention relates to certain new and useful improvements in sound boxes for talking machines as will be fully described hereinafter and particularly pointed out in the appended claims.

In the drawings accompanying and forming part hereof and which, it will be understood, represent the preferable though not necessary embodiment of my invention—Figure 1 is a perspective view of a sound box made in accordance with my invention. Fig. 2 is a vertical central section of the same. Fig. 3 is a side elevation. Fig. 4 is a section taken at substantially right angles to that shown in Fig. 2. Fig. 5 is a perspective view of the stylus bar detached. Fig. 6 is a view of the blank from which the stylus bar is formed. Fig. 7 is a perspective view of a modified form of stylus bar detached. Fig. 8 is a side elevation of a sound box having the modified form of stylus bar attached thereto. Fig. 9 is a perspective view, similar to Fig. 4, of a modified form of insulating device. Fig. 10 is a perspective view of a modified form of lining for the inside of the sound box.

Referring now to the details of the drawings by numerals: 1 designates the back of the box having a flat wall 2, against which the diaphragm vibrates, so that the vibrations are thrown from the diaphragm 4 directly against the flat surface of the back of the box. This back 1 may be secured in the box 5 in any desired way but I prefer to have the box proper cup shaped as indicated in Fig. 2 and the back 1 recessed as illustrated in Fig. 4 so that the back may be dropped into the cup shaped box proper. The back 1 also preferably has two pins 6 which project into perforations in the flange of the cup shaped box 5. To prevent the vibrations from being transmitted from the cup shaped box 5 to the back 1, and thence to the machine, I line the interior of the box with a rubber or other suitable ring 8 shown in

Fig. 4. I also provide the openings in the flange of the box 5, into which the pins 6 project, with a bushing of rubber or other suitable material 10, this bushing not only acting to thoroughly insulate the pins 6 of the back 1 from the flange of the box, but also acting as a spacing device to prevent the rear wall of the back 1 from contacting with the flange of the cup shaped box 5. Thus it will be seen that the back 1 is insulated both from the inner wall of the cup shaped box 5 and also from the flange of the box, while the back may yet be supported upon the pins 6 so as to have slight independent movement in the box. The front surface of the back 1 near its periphery is rounded off as indicated at 12 in Fig. 4 and a tubular or any other form of gasket 14 is located in the groove formed between the rounded off part 12 of the front of the back 1 and the rubber lining 8. This gasket 14 forms the seat for the diaphragm 4 as will be seen from Figs. 2 and 4. A similar gasket 16 is placed on top of the diaphragm and a ring cover 18 is employed to hold these parts in position, this ring 18 having a flange 20 which fits over the outside wall of the box 5, the ring cover being secured to the box by means of screws as 22.

The stylus bar is of novel form and is also secured to the cover of the sound box in a novel manner. One form is shown in Figs. 1, 2, 3 and 5. In this form, I provide a cross bar 24 which has a triangular opening therein through which is secured, as by soldering, a stylus bar 26 preferably made of one piece of any desired material, with one part thereof formed of triangular shape for the purpose of holding the needle. The blank from which this stylus bar is formed is shown in Fig. 6, and the rectangular portion 27 is bent into triangular shape, as shown in Figs. 1, 5 and 7, with the opening 28 for the needle extending clear through the triangular part or from one end to the other. The usual set screw 30 is provided to secure the needle, either of the cylindrical or triangular form, in the socket of the stylus bar. As the triangular socket is open at both ends, the socket is in reality a breech loader for the needles may be inserted through the opening 28 in the upper end, see Fig. 1 and shoved through the bar 26, the set screw 30 of course

being loosened first, whereby the needle to be inserted will cause the expulsion of the used needle. The upper end of the stylus bar 26 is of course made in the usual thin manner and may be connected to the diaphragm 4 in the ordinary or any desired manner. The cross bar 24 to which the stylus bar is secured is preferably provided with two projections 32, having knife edges, and these co-operate with hook shaped members 34 whose rear ends project through the bar 24 and have securing means 36 thereon. This construction is particularly adapted to co-act with collars 38 having annular grooves into which fit the hook shaped ends 34 and the knife projections 32. After the collars are securely held between these parts 32 and 34, the stylus bar may be secured to the cover 18 by means of screws 40 which pass through openings in the collars 38, thus securing the collars and the cross bar to the sound box. I prefer to form these collars of wood fiber but any other desirable material may be used.

In lieu of the stylus bar and its connections shown in Figs. 1, 2 and 3, I may employ the form shown in Fig. 7. Here, instead of using hook shaped members as indicated in Fig. 5, I employ loops 42 which are secured as by riveting to the cross bar 44, set screws 46 being employed having pointed ends. The thin loops 42 and the pointed ends of the screws 46 enter the grooves in collars identical with the collars 38 shown in Fig. 1. In both forms of this securing device it will be seen that I have a grooved collar with a screw passing through the collar to attach the same to the sound box and that the fulcrum of the stylus bar rests in the groove in the seat of the collar. Thus the fulcrum of the stylus bar is securely held in the grooved collars, while allowing free vibrations of the stylus bar. In the form shown in Fig. 7, the triangular part of the stylus bar does not pass on both sides of the cross bar 24 but the flat part of the stylus bar passes into a recess of the bar 44 and is soldered therein so that the stylus bar is of one piece as in the other form, and yet passes on both sides of its cross bar.

In lieu of the construction shown in Fig. 4, I may employ the construction shown in Fig. 9. In this modification the interior lining of the cup shaped sound box is itself formed cup shaped in that it has a flange 50 which extends between the flange 52 of the box 5 and the rear side of the back 1. The said flange 50 has a reinforced opening therein through which projects the pin 6 on the back of the sound box. A perspective view of this modified form is shown in Fig. 10. The small projections 53 are for the purpose of absorbing and not trans-

mitting the heavy vibrations transmitted through the stylus bar.

From the foregoing and accompanying drawings, it will be seen that I have provided a sound box in which there is no chance for the vibrations to be transmitted from the needle to the vibrating wall through any metallic portion of the box. In other words, the box 1 upon which is formed the flat wall 2 is not only insulated as is usual from the diaphragm by means of a rubber gasket, but the rear wall and the periphery of the back 1 are also effectually insulated from the cup shaped box 5 so that any vibrations which might otherwise leak through the wood fiber collars 38 to the cup shaped box will be prevented from being transmitted by the back 1 to the machine. Furthermore, the fact that the back 1 having the flat wall 2 is not rigidly secured to the cup shaped box, but may vibrate slightly upon the pins 6, while the insulating medium between the parts, effectually prevents any metallic vibrations from being transmitted to the machine.

It is obvious that changes and modifications may be made without departing from the spirit of my invention, the scope of which is set forth by the appended claims.

What I claim as my invention is:

1. The combination, in a sound box, of a box proper having a flange at the rear thereof, a back within the box with its rear surface facing the inner surface of said flange, said flange and said back having a pin and an opening, the pin on one part projecting into the opening in the other, and sound absorbing material between the inner surface of the flange of said box and the outer surface of said back and surrounding said pin.

2. The combination, in a sound box, of a box proper having a flange at the rear thereof, a back within the box having its rear surface facing the inner surface of said flange, said flange and said back having a pin and opening the pin fitting within the opening, sound absorbing material between the edge of the back and the inner wall of the box proper, and sound absorbing material between the inner surface of the flange of said box and the outer surface of said back, said material surrounding the aforesaid pin.

3. In a sound box, a cross bar, and a stylus bar formed of one piece of material having one end bent to be secured to the diaphragm and the other end formed of triangular shape adapted to receive a needle, said triangular part extending on both sides of said cross bar.

4. In a sound box, a cross bar, and a stylus bar formed of one piece of material having one end bent to be secured to the

diaphragm and the other end formed of triangular shape adapted to receive a needle, said triangular part extending on both sides of said cross bar and having an opening at each end whereby it may be loaded at the rear end.

5 5. The combination, in a sound box, of a cross bar having securing members thereon, projecting parts on said cross bar, col-

lars secured between said projecting parts 10 and said securing members, one of said last named parts being adjustable.

In testimony whereof I affix my signature in presence of two witnesses.

LOUIS K. SCOTFORD.

Witnesses:

HENRY F. HAEKER,

FRIDA M. BIELENBERG.

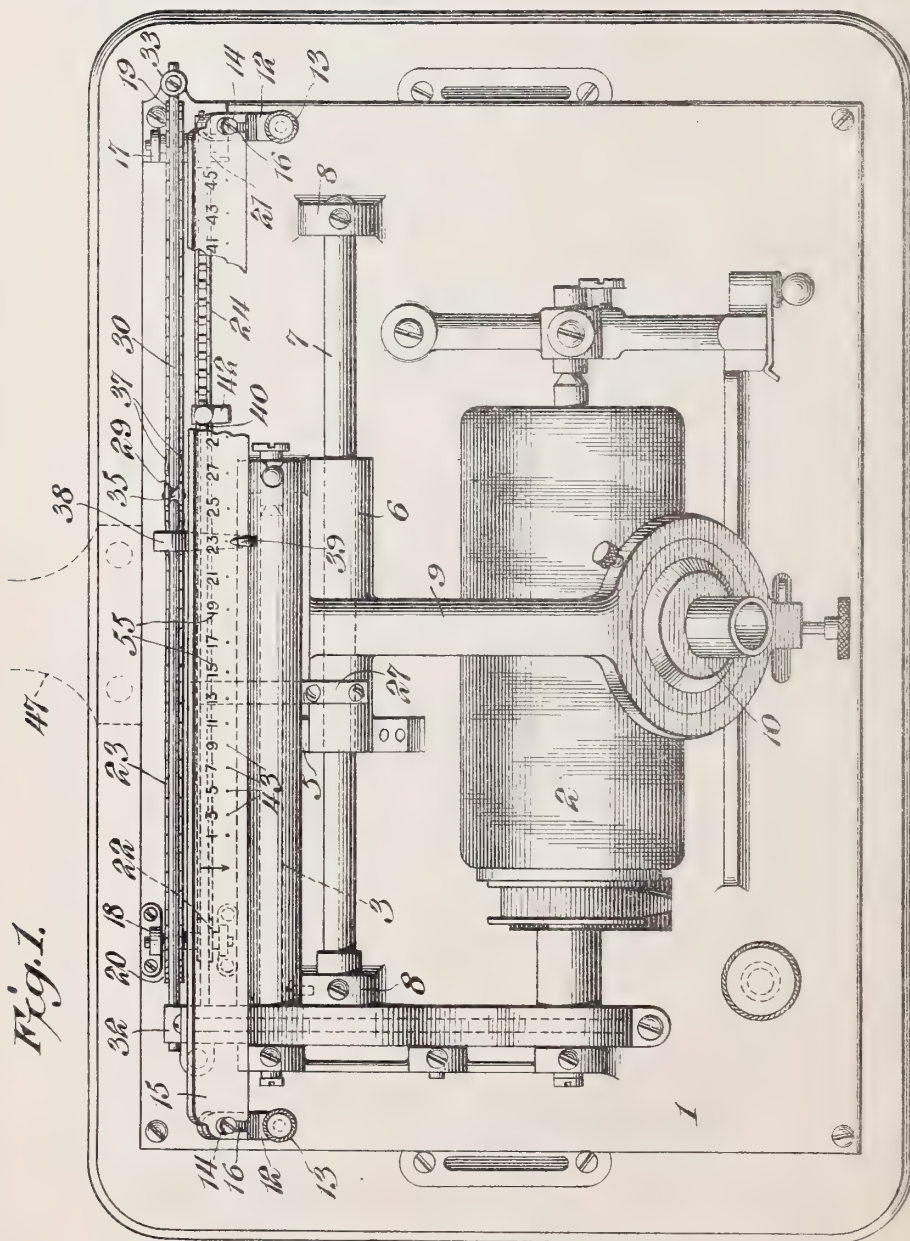
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

PHONOGRAPH ATTACHMENT,
#1,204,341-----C. L. Chisholm,
Patented-November 7th, 1916.
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C. L. CHISHOLM.
 PHONOGRAPH ATTACHMENT.
 APPLICATION FILED JULY 17, 1911.

Patented Nov. 7, 1916.
 3 SHEETS—SHEET 1.



Charles L. Chisholm, Inventor,

Witnesses

Howard D. Orr.
 J. H. Siggers.

By

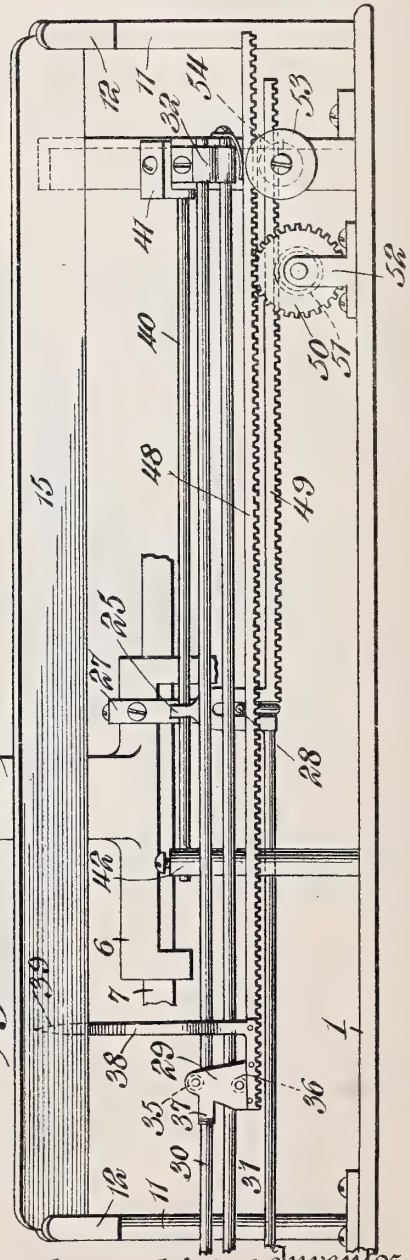
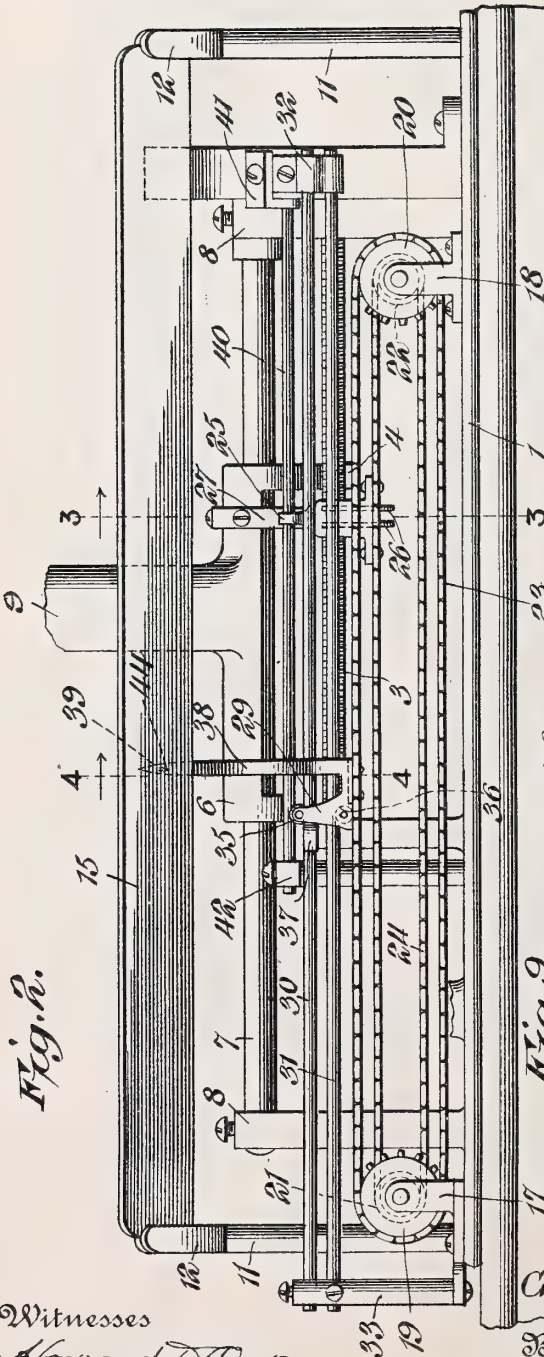
E. G. Siggers.
 H. J. Chapman
 Attorneys.

C. L. CHISHOLM.
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3 SHEETS—SHEET 2.



Charles L. Chisholm, Inventor,

Witnesses
 Howard D. Orr.
 J. H. Siggers.

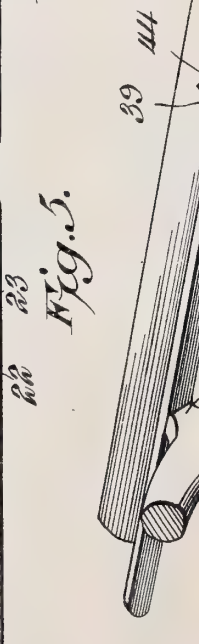
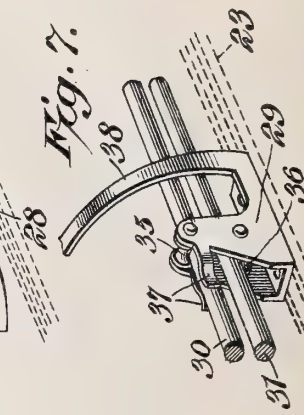
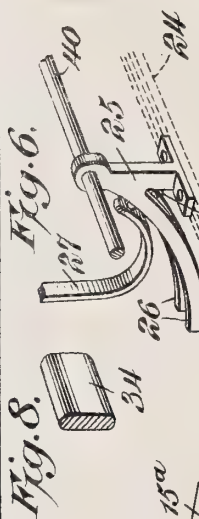
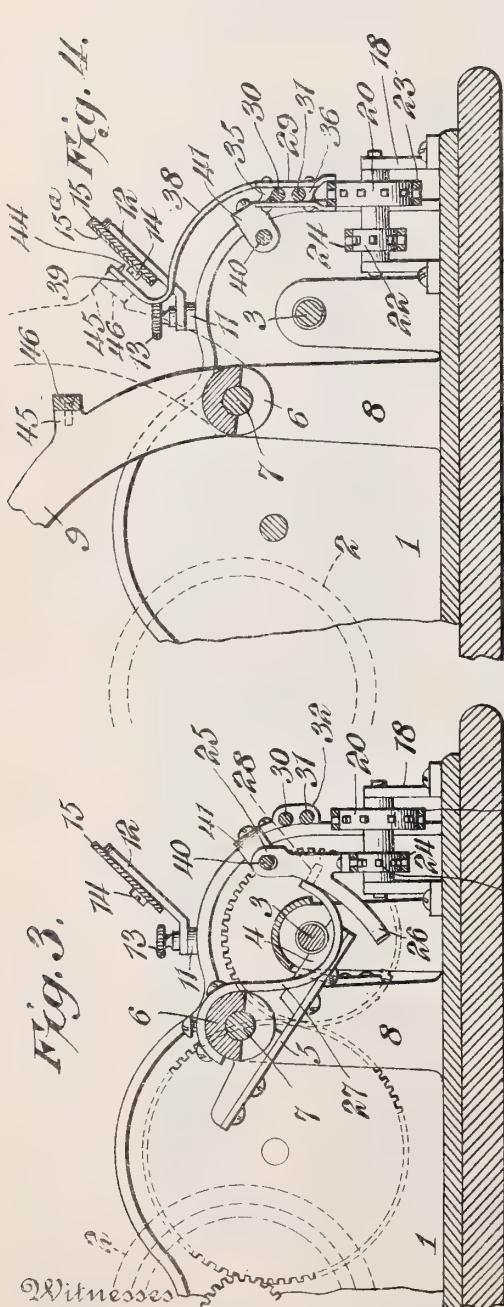
By
 E. J. Siggers.
 H. J. Chapman
 Attorneys.



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 PHONOGRAPH ATTACHMENT.
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 3 SHEETS—SHEET 3.



Witnesses
 Howard D. Carr
 J. W. Siggers

Charles L. Chisholm, Inventor,

By

E. G. Siggers
 H. J. Chapman
 Attorneys

UNITED STATES PATENT OFFICE.

CHARLES L. CHISHOLM, OF MARYSVILLE, NEW BRUNSWICK, CANADA, ASSIGNOR OF
ONE-FOURTH TO EDWARD G. SIGGERS, OF WASHINGTON, DISTRICT OF COLUMBIA.

PHONOGRAPH ATTACHMENT.

1,204,341.

Specification of Letters Patent.

Patented Nov. 7, 1916.

Application filed July 17, 1911. Serial No. 638,977.

To all whom it may concern:

Be it known that I, CHARLES L. CHISHOLM, a subject of the King of Great Britain, residing at Marysville, in the county
5 of York, New Brunswick, Canada, have invented a new and useful Phonograph Attachment, of which the following is a specification.

This invention has reference to improvements in means for the teaching of music, whether vocal or instrumental, and its object is to provide an indicating means attachable to a sound reproducing machine, whereby the teaching of large classes of students, whether in public schools or elsewhere is greatly facilitated.

In accordance with the present invention great skill on the part of the teacher in demonstrating the music is not required, since
20 with the present methods of sound recording it is possible to provide records of either vocal or instrumental music as produced by the best artists with the highest degree of perfection as to rhythm, phrasing, expression, absolute pitch, intonation, etc., so that
25 all the difficulties of these various characteristics of the music may be instilled into the students or pupils infinitely better and quicker than by the ordinary methods of teaching where the pupils must depend for
30 their example upon the individual teacher, who either from lack of training or overwork is unable to accurately impart to the pupils the various characteristics of the
35 music.

The teaching of large classes should be adapted to the progress of the pupils of less acute conception of the music, and it becomes necessary to repeat, in some instances
40 many times, certain portions of the music before all the pupils capable have properly grasped the correct characteristics of the music as exemplified by the sound record. The present invention contemplates means
45 whereby the teacher may repeat any particular part of the record at will as many times as desired without the necessity of reproducing more than the particular part wanted, and in order that this may be done,
50 the means for enabling the teacher to set the instrument to the desired point must be of the grosser type in order that a setting of the machine may be done quickly and no

time need be lost either by the difficulty of finding the point where the reproduction
55 should begin or end and without the liability of reproducing more of the selection than is necessary for the purpose.

The present invention is designed to be used in conjunction with a chart or charts
60 giving the musical notation, and such information as may be useful in connection with the sound record, so that the pupil is trained both by eye and ear, and by hearing correct reproductions of the music becomes
65 trained in the proper interpretation and rendition of the music, the sound reproducing machine being capable of giving practically infallible examples for the guidance of the pupil.

The present invention contemplates a structure which may be attached to a sound reproducing machine, and which is so arranged that indicating members are caused
70 to have a magnified range of travel by the progressive movement of the sound record where the tablet moves both rotatively and progressively, or the tone arm where the latter travels progressively over the sound
75 record, whereby the teacher may readily set the reproducer of the machine to the desired point for repetition of a portion of the sound record without liability of overlapping or failing to include the beginning
80 of the part to be repeated. Moreover, the invention contemplates means whereby the teacher may mark the chart for musical characteristics, say, for instance, for phrasing, and may then produce an index individual to the sound record which will agree
85 with the musical notation of the chart.

The invention will be best understood from a consideration of the following detailed description, taken in connection with the accompanying drawings forming a part
90 of this specification, with the understanding, however, that while the drawings show practical embodiments of the invention as applied to a known type of sound reproducing machine, the invention is susceptible
100 of other practical embodiments and may be changed and modified in structure to adapt it to other types of sound reproducing machines without departure from the salient features of the invention.

In the drawings,—Figure 1 is a plan view

of a sound reproducing machine with the invention applied. Fig. 2 is a rear elevation, with some distant parts broken away, of the structure shown in Fig. 1. Fig. 3 is a section on the line 3—3 of Fig. 2. Fig. 4 is a section on the line 4—4 of Fig. 2, but modified by the inclusion of an additional element. Fig. 5 is a perspective view of a portion of the structure of Figs. 1 and 2 and including the additional element indicated in Fig. 4. Fig. 6 is a perspective view taken from the rear of the connection between the indicating structure of the present invention and the feed nut of the sound reproducing machine. Fig. 7 is a perspective view taken from the rear of the machine of a portion of the indicating mechanism. Fig. 8 is a detail perspective view of a modified form of a portion of the attachment. Fig. 9 is a view similar to Fig. 2 but showing a somewhat modified form of the structure.

Referring to the drawings there is shown a sound reproducing machine 1 which, being of known type, requires no special description as to its mechanism, and only such parts will be referred to specifically as have to do with the parts coöperating with the sound reproducing machine for the purposes of the present invention. The particular type of sound reproducing machine shown is that known in the trade as the Edison phonograph and is, therefore, capable of sound recording as well as sound reproduction. It is to be noted that the invention is, of course, not limited to an Edison phonograph, but is readily adaptable to the machine known as the graphophone or the machine known as the gramophone, or the Victor talking machine. In fact, the invention is not limited to any particular type of sound reproducing machine, and the sound reproducing machine shown in the drawings is, therefore, to be taken as simply typical of any sound reproducing machine, whether such machine be capable of recording sound or not. In the drawings, the machine is shown as provided with a sound record 2, which is illustrated as of the cylindrical type, but may be taken as also typical of the disk type of sound record when the invention is adapted to the disk type of sound reproducing machine.

In the particular type of sound reproducing machine shown in the drawings, there is provided a feed screw 3, to which may be applied the usual half-nut 4, the latter being connected by an arm 5 to a sleeve 6 mounted on a rod 7 secured at the ends in posts 8 rising from the supporting plate of the working parts of the machine. The sleeve 6 has formed thereon or fast thereto an arm 9 carrying at the end remote from the sleeve a sound box 10 adapted to engage the sound record groove of the record tablet

2, after the usual manner, to reproduce the sound recorded on such tablet, and customarily the reproduced sound is amplified by a suitable horn, which latter, however, is not shown in the drawings. The sleeve 6 and arm 9, therefore, constitute a carrier or carriage for the sound box and its stylus. In the particular machine illustrated in the drawings as the sound box is brought into reproducing relation to the sound record the half-nut 4 is brought into engagement with the feed screw 3, and when the sound box is moved away from the record about an axis defined by the rod 7, the half nut 4 is at the same time moved away from the feed screw 3 and the sound box may be then freely moved lengthwise of the rod 7, which is parallel with the feed screw 3 and with the longitudinal axis of the sound record groove when the sound record 2 is mounted on a machine. Consequently the sound box may be moved to any point desired, this being an arrangement common to all types of sound reproducing machines.

In the structure shown in the drawing there are erected on the supporting plate of the machine near opposite ends thereof posts 11, these posts being near the rear of the machine, considering the part of the machine carrying the sound record as the front of the machine. Each post 11 has secured to it at the upper end an angle strip 12 secured to the post by a thumb screw 13 and the angle of the strip 12 is such that the greater portion of the strip is at an angle about midway between the vertical and horizontal considering the sound reproducing machine as a whole as resting upon a level support. The longer portion of each strip 12 has on the forward face a headed pin or stud 14 which for convenience may be in the form of a fillister head screw. The angle strips 12 are designed to receive the ends of an index strip or plate 15, the ends of this plate where engaging the strip 12 being provided with entering recesses 16 each of a size to receive the shank of the corresponding screw 14 but too narrow to permit the head of the screw to pass, so that the index plate 15 is readily secured to the angle strips 12 but may be quickly removed when desired. The fit of the parts is readily adjusted so that the index plate may be placed on a machine or removed at will, but will be retained by the pins 14 with sufficient frictional engagement to avoid accidental displacement of the index strip under ordinary conditions of use. The index strip 15 may be additional to the ordinary index of the machine, so as not to interfere with the use of the machine for other purposes than the purpose of the present invention. The index strip is provided with suitable markings to which reference will hereinafter be made. The posts 11 are

placed comparatively close to the ends of the base plate of the machine and the strip 15 is made correspondingly long, being in the particular construction shown more than
5 twice as long as the record space upon the record cylinder 2.

In the structure shown in Figs. 1, 2, 3 and 4 the base plate carries ear blocks 17, 18, respectively, in which are mounted
10 sprocket wheels 19, 20, respectively. The sprocket wheel 19 has fast thereto a smaller sprocket wheel 21 and the sprocket wheel 20 has fast thereto a smaller sprocket wheel 22. The sprocket wheels 19 and 20 are of
15 like size and the sprocket wheels 21 and 22 are of like size, but in the particular structure shown are of smaller size than the sprocket wheels 19, 20 and a working relation wherein the sprocket wheels 19 and 20
20 are twice the size of the sprocket wheels 21 and 22 has been found to give a satisfactory result. The ear blocks 17 and 18 are spaced apart an appropriate distance which is greater in the particular structure shown
25 than twice the length of the available record surface of the tablet or record cylinder 2. Applied to the sprocket wheels 19 and 20 is an endless sprocket chain 23 and applied to the sprocket wheels 21 and 22 is another
30 endless sprocket chain 24.

The sprocket chain 24 carries a bracket 25 having outstanding from one side two parallel curved fingers 26 having their terminal ends presented toward the front of the machine and appropriately curved. Fast to
35 the sleeve 6 is an arm 27 so curved as to extend under the screw 3 and at the rear end upwardly bent and terminating in a pin 28 adapted to enter the space between the fingers 26. The curvature of the fingers 26
40 is such as to be concentric to the longitudinal axis of the rod 7, so that when the sound box is lifted from or returned to the sound record, the pin 28 will travel along between
45 the fingers 26 without disengaging therefrom. The arm 27 with its finger 28 is designed to serve as a propelling means for the bracket 26 and chain 24, and as the chain 24 engages the two pinions 21 and 22 any
50 movement of the chain in the direction of its length must result in the rotative movement of the two sprocket wheels or pinions 21 and 22, and since these sprocket wheels or pinions are fast to the other sprocket
55 wheels 19 and 20 the rotative movement of the sprocket wheels 21 and 22 is participated in by the sprocket wheels 19 and 20 and the chain 23 is caused to travel in the direction of its length. Since the sprocket
60 wheels 19 and 20 are in the particular instance shown twice the diameter of the sprocket wheels 21 and 22, the chain 23 will travel with twice the linear speed of the chain 24. Fast to the chain 23 is a yoke

bracket 29 straddling two parallel rods 30, 31, these two rods being made fast at one end in a block 32 secured at an appropriate point to a fixed part of the machine and at the other end in a post 33 which may be secured on the eye block 17 and rising there-
70 from. It is evident that the two rods 30 and 31 may be replaced by any other appropriate structure, as, for instance, by a single bar 34 shown separately in Fig. 8. The yoke bracket 29 carries spaced rollers 35, 36
75 adapted to respectively engage the rods 30 and 31, whereby the bracket 26 is guided by these rods and because the rods are spaced apart the bracket is held in a comparatively rigid position although free to move longi-
80 tudinally of the rods. The same fixity of position with the same freedom of longitudinal movement is provided by the single rod 34 and there are numerous other mechanical expedients for accomplishing a like
85 purpose. The yoke bracket 29 is provided with opposite spring fingers 37, adapted to grasp the guide rod or rods, operating as an elastic brake, whereby the yoke bracket 29 while sufficiently free to move lengthwise
90 of the guide rod or rods is held at any position to which it may be moved by the fingers 37 against accidental displacement except by a superior force such as is provided by the feed screw of the sound reproducing machine. The bracket 29 has formed thereon
95 or secured thereto a pointer arm 38 appropriately bent and of sufficient length to extend toward the bracket 29 in first a forward direction until in front of the index
100 plate 15 and then in an upward and backward direction until in overriding relation to the front of the plate 15. This index arm 38 is formed at the free end with a finger 39 in operative relation to the face
105 of the index plate 15 when the latter is in place.

When the machine is in operation reproducing sound recorded upon the sound tablet 2, the sound box is propelled in the
110 usual manner by the feed screw 3 engaging the half-nut 4. This progressive movement of the sound box is imparted to the arm 27 and by the latter through the pin 28 to the bracket 25 and the said bracket in turn
115 drives the chain 24, the bracket 25 being suspended from a guide rod 40 appropriately mounted at one end in a block 41 fast to a fixed part of the machine, and at the other end on a post 42 erected at an appropriate
120 point on the base plate of the machine. The progressive movement of the chain 24 imparts a more rapid movement to the chain 23 in the same direction and consequently the pointer 31 of the index arm or finger 38
125 will travel over the index plate 15 with a speed as much greater than the speed of travel of the sound box over the record as

the relation between the sprocket wheels carrying the two chains.

In order to adapt the index 15 to the magnified speed of the index finger 39, there is produced upon the index plate 15 or upon an index strip 15^a lodged on a strip 15 a series of index points in the shape of dots or indents 43 spaced apart in conformity with the increased travel of the index pointer 39 over the travel of the sound box with relation to the sound record on the tablet 2.

Suppose a teacher desires to prepare the chart of musical notation for some recurrent characteristic of the music, as, for instance, phrasing. The teacher notes on the music the recurrent phrases, as, for instance, by a set of progressive numerals. Then the music already recorded upon the cylinder 2 is reproduced and, of course, the index finger 38 with its point 39 will travel over the strip 15. Such strip is usually made of metal and in order that it may have a comparatively soft impression surface there may be applied thereto a supplemental strip 15^a made of cardboard, paper or other impressionable material, while the end 39 of the finger 38 is provided with a pointed pin 44 substantially perpendicular to the plane of the outer surface of the strip 15^a. The teacher may listen to the music as reproduced by the machine, and at the beginning of each phrase or desired passage may push the pin 44 toward the strip 15^a to cause the point of the pin to make an impression in such strip and the movement may be sufficiently rapid to make it unnecessary to stop the machine. When the pointer arm or finger 38 is provided with an impression making pin 44, the end 39 carrying the pin 44 may be made sufficiently elastic to bend without a corresponding bending of the main portion of the finger 38.

It is sometimes advisable to cause the impression by the pin 44 when the sound box is not being impelled by the record, but without causing the driving mechanism of the machine to stop. For this purpose the arm 9 carrying the sound box is formed at an appropriate point with a stud 45 to which is made fast a bar 46 extending laterally to each side of the arm 9, the said bar 46 being parallel to the rod 7 and plate 15 with its impression surface 15^a. The bar 46 is of such length and so related to the arm 9 that some portion of the bar will always be in position to engage the end 39 of the finger 38 when the sound box is elevated from operative relation to the sound record and is swung away from the same about the bar 7 as a pivot support, and when the arm 9 is swung sufficiently to the rear the bar 46 is caused to engage the end 39 of the finger 38 and force the pin 44 into the receiving strip 15^a, thereby making an impression therein, while the sound box and its carrying arm 9

is not moving progressively. When the sound box is returned to its first position, that is, into engagement with the record groove, the reproduction of the sound at once starts where it was interrupted by the lifting of the sound box from the sound record, and this operation may be repeated at proper intervals until there are produced upon the record receiving surface 15^a all the indications of the particular characteristic desired by the teacher embraced within the recorded music, and likewise marked upon the chart. In order to support a music chart upon the machine, especially where such chart is of small size, the machine may be provided with a holder 47 indicated in dotted lines in Fig. 1. Where the chart is of large size and designed to be supported upon an easel or upon a wall the music holder may be omitted. Whether the large chart or the small size charts be used in connection with a machine, small charts may be provided for the pupils individually.

In Fig. 9 a somewhat different mechanism for producing the magnified movement of the index finger is shown. The two chains 23 and 24 are replaced by racks 48 and 49, respectively, the rack 48 being made fast to the bracket 29 carrying the finger 38 and the rack 49 being made fast to the bracket 25 impelled by the arm 27. The two racks engage respective gear wheels 50 and 51 connected together and mounted in an ear block 52 carried by the base plate of the machine. The racks are also provided with supporting rollers 53, 54 journaled on a fixed portion of the machine. The action of the structure shown in Fig. 9 is the same as the structure shown in Figs. 1 and 2, except that the free ends of the racks will in one position extend beyond the margins of the machine, but otherwise the structure is in effect no different from the structure of Figs. 1 and 2.

In any system of teaching a teacher should impart to the pupils very thoroughly the theory upon which the music is based, and then impress this theory upon the minds of the pupils by the practical demonstration afforded by the operation of the sound reproducing machine, the conditions rendering it possible to produce the audible examples with absolute accuracy as to pitch, time and phrasing. By varying the speed of the sound reproducing machine within suitable limits the same record may be reproduced in different keys. With the present invention a teacher may without loss of time or stopping the machine select any passage or phrase of the record and repeat the same to a class until the most delicate shades of interpretation are thoroughly impressed upon the minds of the hearers. This is facilitated by associating with the indica-

tions 43 numerals 55 or other indicia which may be likewise indicated either upon a key chart in the hands of the teacher or upon the machine or upon the wall chart or the hand charts possessed by the pupils, the teacher readily selecting the passage to be repeated and by moving the sound box until the index end 39 of the finger 38 agrees with the proper indication 43, the sound box may be moved into engagement with the record with the assurance because of the magnified travel of the index finger that the machine will at once begin to reproduce the desired phrase or passage beginning at the proper note without liability of reproducing several undesirable notes or beginning late in the passage to be reproduced.

Where duplicate records are made, a single master index may be prepared in the manner set forth by impressing indications upon an impressionable strip 15^a and from this latter strip index plates 15 of a more permanent character may be produced to accompany the duplicate records, and in very exceptional cases different index strips for different characteristics may also be provided for the same record. However, the one index from the master index will usually suffice for the most exacting requirements.

While straight index strips and two means for magnifying the travel of the index pointer over them have been shown, this does not preclude the use of other shaped indexes or other means for magnifying the travel of the pointer with reference to the progressive travel of the sound record or other impelling means.

Sound record tablets even when made from a single master record will sometimes vary in length or point of beginning so that it becomes necessary to adjust the index member to the particular sound record, and this is provided for by the angle strips 12 and thumb or set screws 13. Moreover, the beginning of the index may be indicated by a distinctive mark as by the arrow shown on the index plate 15 in Fig. 1, adjacent the left hand or beginning of the index markings.

What is claimed is:—

1. An attachment for sound reproducing machines comprising an index finger or pointer, and means responsive to the progressive movement of the sound reproducing elements of the sound reproducing machine for causing a greater linear movement of the index or pointer than the linear movement of the sound reproducing elements with relation to the sound record.

2. In a sound reproducing machine, sound reproducing elements movable progressively with relation to a sound record,

and indicating means for the progress of the sound reproducing elements with relation to the sound record, said indicating means including an index or pointer, and speed magnifying connections between those parts of the sound reproducing mechanism movable with relation to the record and the index or pointer.

3. In a sound reproducing machine having sound reproducing devices, movable progressively with relation to a sound record tablet on the machine, an index member of greater length than the extent of travel of the sound reproducing devices with reference to the record, an index or pointer movable along the index member, and speed multiplying connections between the sound reproducing devices and said index or pointer.

4. In a talking machine provided with a sound box and carrier therefor, and also with a support for a sound record, an index member having indicia thereon, an index or pointer movable with relation to said index member, and connections between said index or pointer and the sound box carrier movable progressively with relation to a sound record mounted on the machine, said connections including means for imparting to the index or pointer a greater range of movement than the movement of the sound box carrier.

5. In a talking machine provided with a sound box and carrier therefor, and also with a support for a sound record, an elongated index member, an index or pointer mounted for linear movement along and with respect to said index member, and attachments for connecting the index member to the sound box carrier of the machine, said attachments being movable progressively with relation to a sound record when mounted on the machine for impelling the index or pointer, and including coactive rotating members of different diameters and linearly movable members individual to the different coactive rotating members, one of said linearly movable members being connected to the index or pointer and the other to the sound box carrier.

6. In a talking machine provided with a sound box and carrier therefor and also with a support for a sound record, an elongated index member, an index or pointer mounted for linear movement along and with respect to said index member, and attachments for connecting the index member to parts of the machine movable progressively with relation to a sound record when mounted on the machine, said attachments comprising connected sprocket wheels of different diameters, sprocket chains engaged by said sprocket wheels, a device on one sprocket

chain carrying the index or pointer, and a device on the other sprocket chain adapted for connection to the said movable part of the machine.

5 7. In a sound reproducing machine provided with sound reproducing devices movable progressively with relation to a sound record mounted on the machine and also capable of movement to and from the sound
10 record, an elongated index member, an index or pointer mounted for movement along said index member in operative relation thereto, and relatively movable connections between the index or pointer and movable
15 sound reproducing devices for maintaining operative relation between said index or pointer and the sound reproducing devices irrespective of the movement of the sound reproducing devices to and from the sound
20 record.

8. In a talking machine, the combination of a tablet support, a sound box and carriage therefor, and means imparting movement to said carriage and sound box past
25 said tablet support, with an impression device comprising an impression receiving surface and means for making an impression thereon, one member of said impression device being movable past the other, and
30 means whereby the movement of the carriage imparts movement to the movable member of the impression device, the impression making means being provided with an index or pointer whereby said means
35 serves to both make the impression and indicate the location of the same after it is made.

9. In a sound reproducing machine, means for supporting an elongated index member
40 having an impression receiving surface, an index or pointer and means whereby the index or pointer is caused to respond to progressional movement of the movable sound reproducing devices of the machine, said index
45 or pointer being provided with an impression producing point movable into engaging relation with the impression receiving surface of the index member mounted on the machine.

10. In a sound reproducing machine having sound reproducing members movable progressively with relation to a sound record mounted on said machine, means for the support of an index member, an index or
55 pointer movable over an index member when mounted on the machine and provided with a marking member adapted to then engage the index member, and means carried by the movable sound reproducing devices and movable by said devices into engagement with the index or pointer to cause the marking member of the latter to actively engage an index member when mounted on said machine.

11. In a sound reproducing machine having sound reproducing devices movable progressively with relation to a sound record mounted on the machine, a support on the machine for an elongated index member, an index or pointer provided with connections with the said movable sound reproducing devices, and also provided with a marking member movable into engagement with the index member when on the support, and a bar on the movable sound reproducing devices movable by the latter into engagement with the index or pointer to actuate said index or pointer to carry the marking device thereof into engagement with the index member when on the support.

12. In a sound reproducing machine having sound reproducing devices movable progressively with relation to a sound record mounted on said machine, a support for an elongated index member, a pointer movable linearly with relation to the elongated index member when on the support, means for imparting to the index member a greater extent of travel than the progressive movement of the sound reproducing devices, said index member being also provided with a marking member movable into engagement with the index member when mounted on the machine, and an elongated bar carried by the sound reproducing devices and movable by the latter into engagement with the index or pointer to move the marking device thereof into engagement with the index member when mounted on the machine.

13. In a sound reproducing machine, an index member having indicia representing characteristics of a musical composition and a distinctive mark indicating the beginning of the composition recorded, an index pointer movable over the index member where in place in response to the travel of the sound reproducer of the machine with relation to the sound record, and a support for the index member having means for the adjustment of said index member to conform with variations in different sound records, said means comprising pivoted strips and readily manipulated clamping means for holding the strips in adjusted positions.

14. In a talking machine the combination of a revoluble tablet support, a sound box and carriage therefor, and means imparting movement to said carriage and sound box past said tablet support, with an impression device comprising an impression receiving surface and means for making an impression thereon, one member of said impression device being movable past the other, and means whereby the movement of said carriage imparts movement to the movable member of said impression device past the relatively stationary member of said device.

15. The combination of a talking machine comprising a revoluble tablet support, a movable carriage for the stylus, a stationary impression receiving surface, and means
5 moved by the carriage along said surface in operative juxtaposition thereto and ready at all times for making an impression thereon.

In testimony that I claim the foregoing as my own, I have hereunto affixed my signature in the presence of two witnesses.

CHARLES L. CHISHOLM.

Witnesses:

J. C. ANDERSON,

W. H. IRVINE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

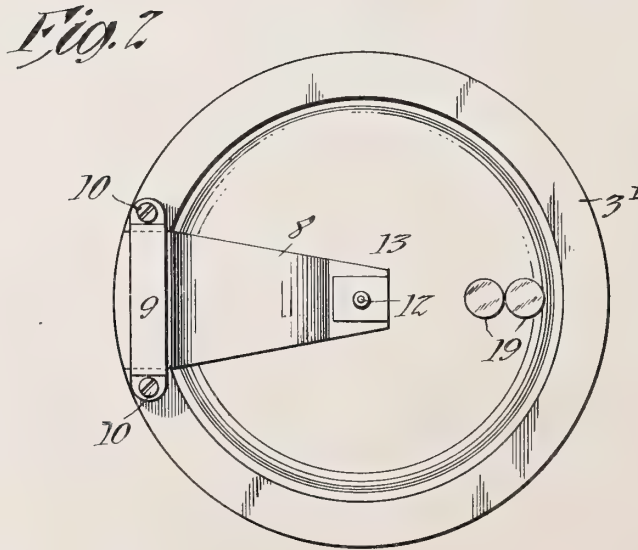
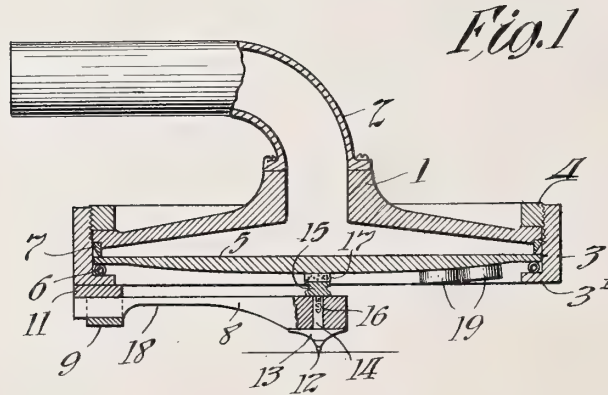


SOUND BOX,
#1,204,420-----T. A. Edison,
Patented-November 14th, 1916.
Filed-March 24th, 1911.

T. A. EDISON.
- SOUND BOX.
APPLICATION FILED MAR. 24, 1911.

1,204,420.

Patented Nov. 14, 1916.



Witnesses:
Frank D. Lewis
Frederick Bachmann

Inventor:
Thomas A. Edison
by Frank L. Allen
his Atty.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR TO
NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION
OF NEW JERSEY.

SOUND-BOX.

1,204,420.

Specification of Letters Patent.

Patented Nov. 14, 1916.

Application filed March 24, 1911. Serial No. 616,755.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a description.

My invention relates to sound boxes particularly of the type adapted for use in connection with disk records having vertically undulating grooves, although its use is not limited to that type.

The principal object of my invention is to construct a reproducer giving an improved quality of reproduction by the elimination of minute scratch vibrations and by the reduction of the objectionable prominence of high or low notes so as to produce a mellow tone. In conformity with this object, I insert between the stylus arm and the center of the diaphragm a yielding, non-metallic member of short elasticity, preferably of cork, to absorb the scratch vibrations; and in order to balance up the tone, I weight or dampen the diaphragm eccentrically, or between the center and the periphery, preferably by securing thereto one or more disks or buttons of lead or other suitable material. I also prefer to make the stylus arm of wood or other suitable non-metallic substance so as to eliminate the characteristic "ring" or metallic sound which is produced when the common metallic stylus arm is set into vibration.

Other objects of my invention will appear more fully from the following specification and the appended claims.

In order that a clearer understanding of my invention may be had, attention is hereby directed to the accompanying drawing forming a part of this specification and illustrating the preferred form of my invention.

In the drawing, Figure 1 represents a central vertical section through a sound reproducer embodying my invention; and Fig. 2 represents a bottom plan view thereof.

In both of the views, like parts are designated by the same reference numerals.

Referring to the drawings, the body of the reproducer is formed in any suitable manner as by the flat metallic, conical member 1 having secured thereto a hollow neck 2, bent substantially at right angles, the flanged an-

nulus 3, and the threaded ring 4 screwed into the annulus 3 to position and hold the members as shown. The diaphragm 5 is preferably secured between an annular, rubber gasket 6, of circular cross section and a ring 7 preferably of steel formed with a knife edge as shown which is positioned to contact the edge of the diaphragm in a circular line opposite the center line of the annular gasket 6. By reason of this construction, the diaphragm is permitted to bend on the gasket 6 and ring 7 without buckling. I preferably form the diaphragm 5 of wood pulp board making the inner face thereof plane and the outer face thereof except for a short distance from the periphery convex; so that the diaphragm has substantially the shape of a segment of a sphere. This form gives to the diaphragm increased rigidity toward the center and eliminates objectionable local vibrations.

The stylus arm 8 which is preferably made of wood is wedge shaped in horizontal projection and is rigidly secured at its broad end to the member 3 by a bracket or saddle 9 held in place on the horizontal flange 3' of the member 3 by screws or other fastening means 10. A strip 11 of metal or other suitable material is interposed between the stylus arm and the flange 3' so as to space the said arm a proper distance from the diaphragm and is held in place by the bracket 9. The stylus arm 8 extends substantially parallel to the diaphragm to the center thereof under which last named point it supports a stylus 12 which is secured to the center of the diaphragm in the following manner. The stylus, which is preferably a diamond, is mounted in a metallic holder 13 having a flat portion engaging the under side of the arm 8 and a reduced shank 14 extending through and fitting into an opening in the said arm. A screw 15 provided with a threaded shank 16 engages the upper side of the arm 8 and is screwed into the shank 14 to secure the stylus holder in place. A piece of cork or other yielding, non-metallic material 17 of short elasticity is interposed between and secured preferably by shellac or other suitable adhesive to the member 15 and the center of the diaphragm. In order to make the arm 8 resilient in the direction of the movement of the stylus 12, that is, at right angles to the record surface, the lower surface thereof is preferably con-

caved intermediate its ends as shown at 18 so that the cross section of the intermediate portion of the arm is materially decreased. With this construction, the stylus is held 5 firmly in contact with the record groove so that the record is faithfully reproduced, the wedge form of the said arm preventing lateral play of the stylus. Also by reason of the employment of the cork insert 17, a large 10 amount of the minute scratch vibrations ordinarily emitted when the stylus is tracking a record is absorbed.

In order to balance the diaphragm to reduce the objectionable prominence of the 15 very high and low notes which tend to throw false waves on the diaphragm by excessive amplitude, the diaphragm is loaded or weighted eccentrically, or between its center and periphery. This is preferably accom- 20 plished by securing to the diaphragm by shellac or other suitable adhesive one or more weights 19 preferably of lead concentrated at a single position on the diaphragm. When the diaphragm is thus loaded, the 25 vibration of the weighted portion thereof is checked or dampened; so that, as the movements of the stylus are applied to the center of the diaphragm, or eccentrically to the un- 30 weighted or freely movable portion thereof, the diaphragm is not in tune with and does not give undesirable prominence to any particular note. The dampening of the vibra- 35 tions of the diaphragm by the weights also produces a soft mellow tone. The weights 19 produce substantially no bracing effect upon the diaphragm.

While I have shown the preferred embodiment of my invention, many changes may be made in the structure disclosed with- 40 out departing from the spirit of my invention.

What I claim as new and desire to protect by Letters Patent of the United States is as follows:

45 1. The combination of a stylus, a diaphragm, means maintaining said stylus in operative relation to said diaphragm and means for weighting said diaphragm, said weighting means being located entirely to 50 one side of the center of the diaphragm and substantially at a single position on the diaphragm.

2. In a sound reproducer, the combination of a support, a diaphragm supported there- 55 by, said diaphragm having weighting means

located eccentrically thereof and substantially at a single concentrated position thereon, and a reproducer stylus connected with the center of said diaphragm, substantially as described.

3. In a sound reproducer, the combination of a support, a diaphragm supported thereby, said diaphragm having weighting means located eccentrically thereof and substantially at a single concentrated position en- 65 tirely to one side of the center of the diaphragm, and a reproducer stylus connected with the center of said diaphragm, substantially as described.

4. An acoustic diaphragm having means 70 for weighting while permitting substantially free flexure of the same, said means being applied to the diaphragm at a single concentrated position to one side of the center of the diaphragm, substantially as de- 75 scribed.

5. In a sound reproducer, the combination of a diaphragm, a reproducer stylus connected to the center thereof, and means for weighting while permitting substantially 80 free flexure of the diaphragm, said means being applied to the diaphragm at a single concentrated position to one side of the center of the diaphragm, substantially as de- 85 scribed.

6. In a sound reproducer, the combination of a support, a diaphragm supported thereby, said diaphragm having weighting means located eccentrically thereof and substantially at a single concentrated position 90 thereon, a reproducer stylus, and means comprising a yielding non-metallic device for transmitting the vibrations of the stylus to the center of the diaphragm, substantially as described. 95

7. The combination of a stylus, a diaphragm, means maintaining said stylus in operative relation to said diaphragm, and means comprising a button for weighting said diaphragm, said weighting means being 100 located entirely to one side of the center of the diaphragm and substantially at a single concentrated position on the diaphragm, substantially as described.

This specification signed and witnessed 105 this 22nd day of March, 1911.

THOMAS A. EDISON.

Witnesses:

FREDERICK BACHMANN,
ANNA R. KLEHM.

SUBMARINE SIGNALING APPARATUS

#1,204,826-----J. Schiessler,
Patented-Nov. 14th, 1916.
Filed-February 8th, 1908.

1,204,826.

Jesse K. Lutton
B. Rommers

Josef Schiessler
by Henry C. J.
Atty.



J. SCHIESSLER.
SUBMARINE SIGNALING APPARATUS.
APPLICATION FILED FEB. 8, 1908.

1,204,826.

Patented Nov. 14, 1916.
4 SHEETS—SHEET 2.

Fig. 1^a

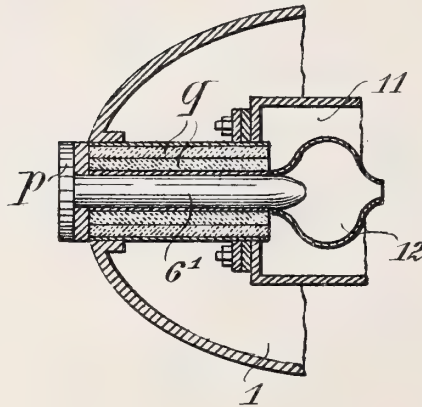
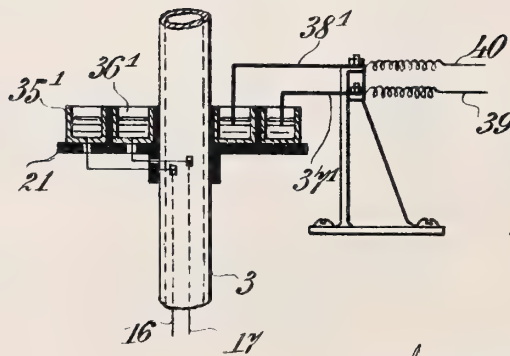


Fig. 1^b



Witnesses
M. J. L. Higgins.
May Ellis

Inventor
Joseph Schiessler
by Henry Orth
Att'y

J. SCHIESSLER.
SUBMARINE SIGNALING APPARATUS.
APPLICATION FILED FEB. 8, 1908.

1,204,826.

Patented Nov. 14, 1916.
4 SHEETS—SHEET 3.

Fig. 2

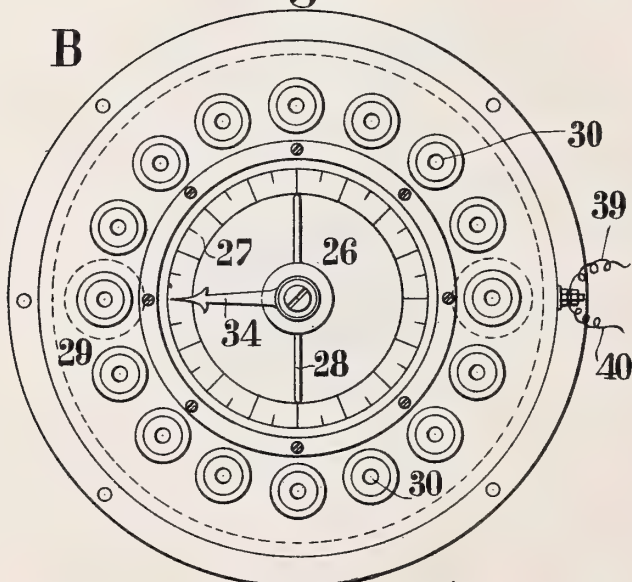
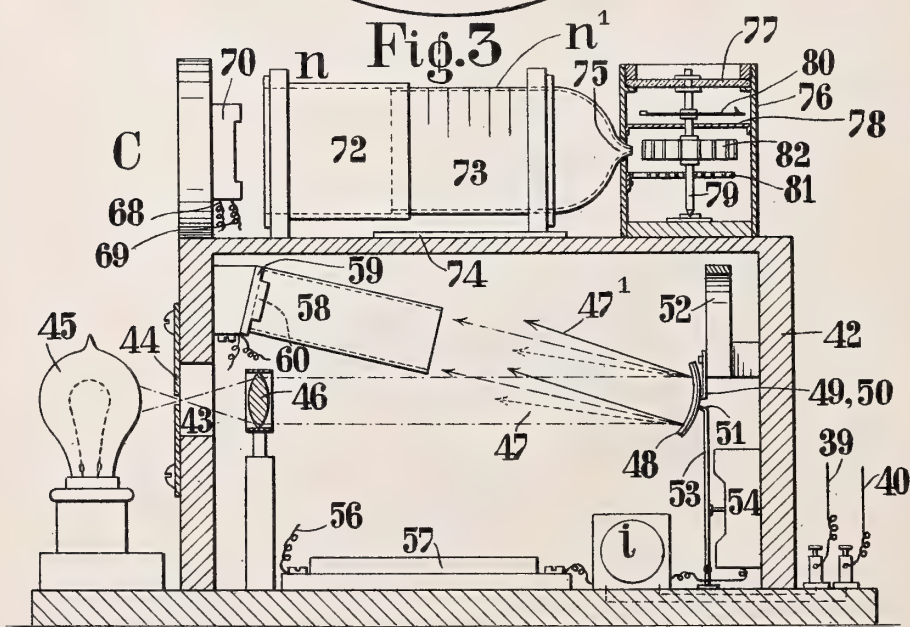


Fig. 3



Witnesses.

Jesse R. Lutton
B. Sommers

Inventor.

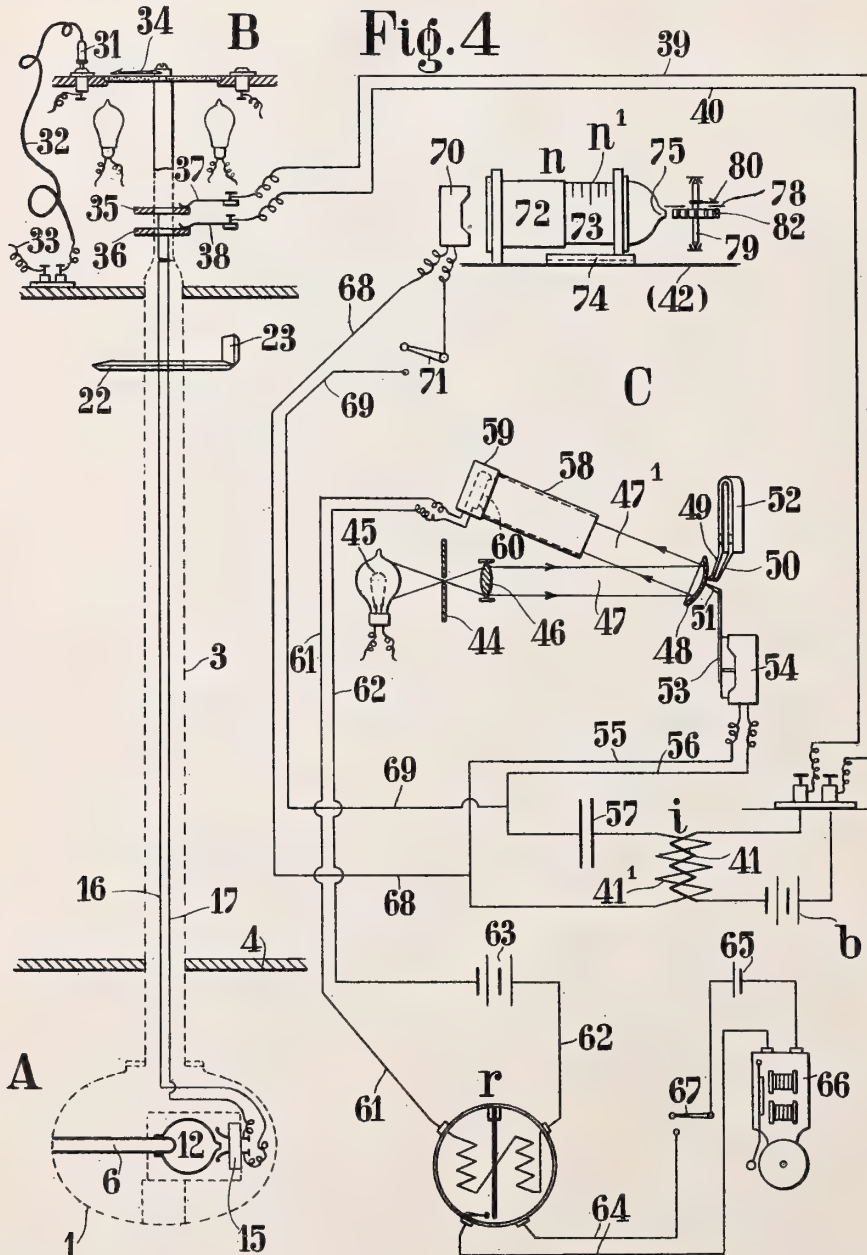
Josef Schiessler
by *Henry Orth*



J. SCHIESSLER.
SUBMARINE SIGNALING APPARATUS.
APPLICATION FILED FEB. 8, 1908.

1,204,826.

Patented Nov. 14, 1916.
4 SHEETS—SHEET 4.



Witnesses.

Jesse K. Lutton.
M. Sommere

Inventor.

Josef Schiessler
by Henry Orth

UNITED STATES PATENT OFFICE.

JOSEF SCHIESSLER, OF BADEN, NEAR VIENNA, AUSTRIA-HUNGARY.

SUBMARINE SIGNALING APPARATUS.

1,204,826.

Specification of Letters Patent.

Patented Nov. 14, 1916.

Application filed February 8, 1908. Serial No. 414,998.

To all whom it may concern:

Be it known that I, JOSEF SCHIESSLER, a subject of the Emperor of Austria-Hungary, residing at Baden, near Vienna, Austria-Hungary, have invented certain new and useful Improvements in Submarine Signaling Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

The object of the invention is to provide a new or improved submarine signaling apparatus, the purpose of which is—1. To determine the position of a submarine source of sound according to the indications on a mariner's compass card, as well as to also determine the distance of such source of sound from the place of observation and to immediately transmit the indication or intimation to various other places. 2. To determine the speed at which a source of sound approaches toward or recedes from the place of observation. 3. To enable signals or spoken sounds to be transmitted under water. The apparatus being such that in such operations the manipulations necessary to be effected by hand are reduced to a minimum. For this purpose there is arranged at the place of observation, such as a ship, lighthouse, etc., a receiver provided with a movable sound seeker which is placed under water and which converts sound waves entering or caught up by it into corresponding electrical waves that first set up mechanical oscillations in the membrane, diaphragm, or the like, suitably arranged to receive them. By means of an optical arrangement and a body the conductivity of which varies under the action of light, such for example as selenium, these mechanical oscillations control an electric signaling circuit, or the operations of an acoustic signal. At the same time the electrical waves produced by the sound waves entering the apparatus are again converted into sound waves by a telephonic arrangement, the air waves thereby produced being adapted to act, if necessary, upon a device whereby the pitch of such waves, or the number of oscillations corresponding to such pitch, can be determined. In order, however, should it be

desired to do so, to transmit sound waves corresponding to a certain pitch, or spoken sound agreed upon in the service, the apparatus may include a transmitter capable of adjustment in any desired direction, and which is adapted to impress upon the water the sound waves produced either by a sound producer, such as a siren or the like, or by spoken sounds, so that such sound waves may be picked up by a receiver of the kind hereinbefore referred to.

A construction of submarine signaling apparatus embodying this invention is illustrated in the accompanying drawings—

Figure 1 shows in central vertical section the receiver placed under water in combination with the indicating apparatus arranged above the water upon a ship, lighthouse, or other position. Fig. 1^a is a view, partly in section, of a modified arrangement of the sound seeker provided with a solid receiving cylinder. Fig. 1^b is a sectional view of the contact device similar to Ampère's frames. Fig. 2 shows the indicating apparatus in plan. Fig. 3 shows, in vertical section, the apparatus for automatically giving the signal and determining the pitch. Fig. 4 shows the arrangement of electrical connections for all parts of the apparatus comprising the receiving device.

A indicates the receiving apparatus, comprising a sound seeker 1 adapted to be placed under water and capable of being rotated about a vertical axis. It may with advantage have the form of an ellipsoid and be made of a material not liable to be attacked by sea water.

3 is a tube having at its lower end a flange 2 to which the sound seeker 1 is attached in a water-tight manner, and which tube serves as the axis of rotation for the sound seeker as well as forming a conduit through which conductors may be led, as hereinafter described.

When the apparatus is used on ships the tube 3 passes in a watertight manner through the bottom 4 of the ship, and to this bottom is fixed a bearing 5 in which the tube can rotate.

Projecting into the sound seeker 1 is an elastic metal tube or cylinder 6 the inner end of which is closed and the outer end of which is open to the outer water in which the device is located. Instead of the body 6 being tubular, as shown, it may in some cases be formed as a solid rod or cylinder made of

elastic material. In this case the outer end of the solid metal cylinder 6', Fig. 1^a, is formed with a circular or other suitably shaped head *p* which is packed or tightened against the ends of the several insulating layers *q* by a washer of india-rubber or other material not liable to be attacked by sea water. In any case its external periphery is insulated from sound, as by an india-rubber sheath 7, a lead tube 8, an india-rubber tube 9 and finally separated from the surrounding space by a brass tube 10. The inner end of the tube 6, or equivalent, projects into a chamber 11 which contains the receiving devices proper, including a resonator 12 which is tightly mounted upon the inner end of the tube and which, if necessary, is tuned to a fixed note.

The outlet nozzle 13 of the resonator 12 projects into the sound horn 14 of a microphone 15, the conducting wires 16, 17, of which are carried upwardly through the tube 3.

The chamber 11 rests upon a sound-proof or sound damping foundation consisting, for example, of layers of india-rubber 18, wood 19, lead 20, and india-rubber 21; the microphone casing is likewise separated from the wall of the chamber by sound damping material, so that conduction of sound through the wall of the sound seeker 1 and the wall of the chamber 11 is minimized or prevented.

For the purpose of increasing the sensitiveness of the microphone 15 the chamber 11 may be filled with a gas under a higher pressure than the surrounding medium.

The tube 3 is rotated at a uniform speed in any suitable manner, say by means of bevel gear wheels 22, 23, from a shaft 24 driven by any appropriate motor, the arrangement being such that immediately the tube or the like 6 crosses the path of sound waves they enter it and are picked up by the receiver.

The receiving apparatus A is in direct communication with an indicating apparatus B situated above the water.

The upper portion of the tube 3, which in the example given is made separate from the remainder, and is suitably connected thereto, (although it may be made in one piece therewith,) passes through the casing 25 of the indicating apparatus, in the cover of which is fitted a ground glass disk 26 having division marks 27 thereon, see Fig. 2. A mark 28 running in the direction of a diameter of the graduated circular disk 26 indicates the position of the axis of the ship to which the apparatus is fitted, in a manner similar to that of a mariner's compass. The outer end of the upper part of the tube 3 is fitted with a pointer 34 which moves over the divisions 27 and is so arranged that it always indicates the position and direction of the tube 3 of the sound seeker 1.

A ring 29 of insulating material, Fig. 2, which surrounds the graduated disk 26 carries plug sockets 30 for a plug contact 31, the said sockets corresponding to the main divisions of the disk 26. The flexible conductor 32 connected to the plug contact 31 is connected with one conductor 33 of an electrical circuit the second conductor of which is connected to all the plug sockets 30. In this circuit, which may be supplied with a current of electricity from any desired source, are inserted indicators arranged in the usual way, and located at all those points of the ship, lighthouse, etc. where the indication is desired.

In the casing 25 are arranged glow lamps for the purpose of enabling the disk 26 to be illuminated from beneath.

To enable the signal to be given automatically when sound waves enter and are received by the receiving apparatus A and the pitch of the sound waves or distance of the approaching or receding source of sound to be determined, the apparatus A is also electrically connected with an apparatus C, see Figs. 3 and 4. For the purpose of producing this electrical connection there are fixed upon the tube 3 two conducting disks 35 and 36, which are insulated therefrom and from each other, and are polished to a high degree of brilliancy, and which are connected to the conductors 14 and 17 leading from the microphone 15.

Rubbing contact springs 37 and 38 are arranged to bear upon the two disks 35 and 36, and these springs are connected by conductors 39 and 40 with the primary coil 41, see Fig. 4, of an induction apparatus *i* which forms a constituent of the apparatus C and which is inclosed in a light-tight closed box 42, see Fig. 3.

In the circuit of the microphone 15 is included a battery *b* see Fig. 4.

In place of the metal disks 35, 36, with the rubbing contacts 37, 38, contact stirrups may be employed which move in an annular mercury trough after the manner of Ampère's frames. This device consists of two concentrically arranged ring-shaped metal troughs, 35', 36', Fig. 1^b, insulated from each other, the said troughs being secured to the tube 3 of the sound seeker 1 by means of a support or carrier 21 common to both of them, so that they will rotate with the tube 3. The troughs 35', 36' are filled with mercury and connected by means of the conducting wires 16, 17, to the microphone 15 of the sound seeker. Metallic contacts 37', 38', that dip into the mercury in the troughs, are connected to the conducting wires 39 and 40.

In the front wall of the light-tight box 42 is an opening 43, which, with the exception of a small orifice, is entirely covered by an opaque diaphragm 44. In front of the dia-

phragm and outside of the box is placed a glow lamp 45, and behind the diaphragm and inside the box is a bi-convex lens 46, one focus of which lies in the opening of the diaphragm 44, so that light rays falling upon the lens 46 emerge from the lens in the form of a parallel pencil of rays 47. The pencil of light rays 47 falls upon a small concave mirror 48, which is formed entirely of iron and is held by three magnetic points 49, 50 and 51, arranged triangularly a short distance from each other, see Figs. 3 and 4. Two of these points (49 and 50) are attached to the poles of a powerful magnet 52, while the third point 51 is mounted upon a small lever 53, which is connected to the diaphragm of a telephone 54, so that when the diaphragm vibrates, its movement to an increased extent is transmitted to the mirror 48, so that such mirror is caused to oscillate about the axis formed by the two other points 49 and 50.

The telephone 54 is electrically connected to the secondary coil 41' of the induction apparatus *i*, Fig. 4, by conductors 55, 56, and advantageously over one or more condensers 57.

When the mirror 48 moves, the pencil of rays 47' reflected therefrom falls through a tube 58 onto a selenium cell 60 arranged in the end or cover plate 59 of the tube and insulated therefrom, which cell is included in the circuit 61, 62, of a battery 63. The circuit 61, 62, also includes a polarized relay *r* which serves to close a second circuit 64 which includes a bell battery 65, a bell 66 of the usual kind, and a hand switch 67.

In a shunt 68, 69 of the circuit 55, 56, is inserted a second telephone 70 which is mounted upon the cover of the box 42 and outside it. This shunt circuit 68, 69 may be made and broken by means of a hand switch 71, which may be so combined with the hand switch 67 that when the shunt circuit 68, 69 is closed the conductor 64 is broken, and vice versa.

Opposite the telephone 70 and on the cover of the box 42 is mounted a resonator *n* which consists advantageously of two parts 72 and 73 adapted to slide telescopically, and of which one, 72, is stationary, while the other, 71, is movable along a guide 74, so that by increasing or diminishing the internal space of the resonator *n* it can be adjusted for resonance within certain limits.

The particular number of oscillations for each adjustment of the resonator may be read off from an empirically determined series of divisions *n'* marked on the movable part 73 of the resonator. In order, however, to enable this resonator to be not only adjusted, but also its action to be seen, the outlet nozzle 75 thereof projects into a casing 76, Fig. 3, which is closed at the top by a transparent glass plate 77, and contains

within it a disk 78 graduated with division marks in a circular row, over which moves a pointer 80 that is mounted upon a spindle 79 capable of easily rotating. To the spindle 79 is connected one end of a thin clock spring 81, which surrounds it, the other end of the spring being connected to the internal wall of the casing. Upon the spindle 79 is mounted a small fan wheel 82 which may with advantage be made of mica, and which is set in rotation by the air emerging from the nozzle 75 when the resonator *n* responds. The greatest movement of the pointer 80 indicates the maximum intensity of the tone or resonance. The deflection of the pointer does not show the tone pitch but shows only the intensity of the tone. It is true that this intensity *per se*, may be due to different causes. But with one and the same resonator the maximum deflection of the pointer shows that during the shifting of the regulable resonator, resonance has finally taken place and that the tone at which this resonance has taken place is the proper one. Consequently the observer can deduce the intensity of the tone from the maximum deflection of the pointer 80.

The apparatus C also enables the speed to be determined with which a source of sound, which produces a tone of definite pitch, approaches toward or recedes from the observer.

The operation of the apparatus comprising the mechanism A, B and C is, assuming a ship to be the place of observation, as follows:—The receiver A, that is to say the sound seeker 1, while surrounded on all sides outside the hull of the ship by water, and accessible on all sides to sound waves, is slowly rotated about its axis 3, so that, assuming there is a sound proceeding from a distant source, at one point of its rotation the receiver will assume a position in which the sound tube or cylinder 6 of the receiver will extend directly in the direction of the distant source of sound. Such sound will then be at its greatest intensity relatively to the receiver and the microphone 15 will be then excited to its greatest extent. The fluctuations of current produced thereby are transmitted by the conductors 16, 17, the rubbing contacts 37, 38, or the mercury contacts replacing them, and the conductors 39, 40, to the primary coil 41 of the induction apparatus *i*. When the microphone responds an alternating current is induced in the secondary coil 41 of the induction apparatus, and the effect of this current is increased by the condenser 57, and acts upon the telephone 54 and sets its diaphragm to vibrating, such vibrations being transmitted to an increased extent through the lever 53 to the mirror 48. The vibrating mirror 48 throws the pencil of light 47' onto the se-

lenium cell 60, which thereupon permits the current from the battery 63 to flow through the conductors 61, 62, and the relay r , which latter closes the circuit 64 of the ringing apparatus 66. If the ringing apparatus then be cut out by means of the switch 67 and the switch 71 be closed, the circuit 68, 69, of the telephone 70 will be completed, and the latter will produce sounds corresponding to the sound waves received. The pointer 34 connected to the sound seeker 1 slowly rotates with the sound seeker, and as soon as it is observed that the intensity of the sound is greatest at a particular position of the pointer this position is noted by the insertion of the plug contact socket 30 corresponding thereto. In this way, as hereinbefore described, the circuit 32, 33, is closed, and the position of the pointer is thereby signaled to all those points of the ship, such as steering house, torpedo room, etc., in which the indicators hereinbefore mentioned are arranged. If the telephone 70 reproduces a sound produced artificially from the distant source by a bell, a siren, a buzzer, or the like of a definite number of vibrations, and not a noise produced in a natural way, such, for example, as that of the ship's screw in motion, the speed of the approaching or receding source of sound can be easily calculated according to the well known Doppler principle, as when a source of sound, which produces a tone of a definite number of vibrations is approached, a higher tone is perceived, and when the source of sound recedes, a deeper one.

With the arrangements hitherto used, it was only possible to determine in which direction a source of sound was to be found, and at the utmost, whether this source of sound was approaching or receding from the observer.

By means of the apparatus hereinbefore described not only the direction but also the distance and the speed of a moving source of sound can be determined by calculation, as the necessary data are supplied by the apparatus described.

The calculation of the speed of the source of sound relatively to the observer is made by means of the well known Doppler principle. The source of sound in the present case is the submarine signaling apparatus of a ship or of a light-house or light-ship, as the case may be. For this purpose an apparatus is necessary, which allows exact determination of the increased number of vibrations, in case the source of sound is approaching, or of the diminished number of vibrations in case the source of sound is receding from the observer. This apparatus consists, as described, of a very sensitive telephone 70, Fig. 4, by means of which the tone collected by the sound detecting device A is reproduced. In the immediate

vicinity of this telephone 70 is arranged an adjustable cylindrical resonator n, n' , on the adjustable part of which is provided a scale on which the different number of vibrations corresponding to tones in proximity to the normal tone emanating from the source of sound are marked. As it is sometimes difficult to rely upon the sense of hearing of the observer, an indication is provided, consisting of a small fan wheel 82 of a very small weight, preferably made of mica or other such material, the axis 79 of which turns on points. The axis carries a smaller pointer movable on a disk 78 which is fixed by means of a small clock spring. If the sound propagated in the sea water is reproduced in the telephone 70, the tone produced by the diaphragm of said telephone is reinforced by means of the resonator and the air vibrations turn the small fan wheel. The deviation of the wheel is greatest when the resonator is adjusted to resonance. On the adjustable part of the resonator the number of vibrations with which resonance is obtained may be read on the scale. If the number of vibrations of the tone received at the observation point is thus determined, the speed of the source of sound, relatively to the observation point may be ascertained.

If N be the number of vibrations of the tone received at the observation point, and is indicated by the instrument, and if n be the number of vibrations of the tone produced at the source of sound, which of course must be known to the observer, and s the speed with which the source of sound approaches or recedes, and is unknown and to be determined, and c the velocity with which the sound is propagated in water equal to 1435 per second, then the well known Doppler principle is expressed by the formula:

$$N = n \left(1 + \frac{s}{c} \right) \quad 110$$

if the observer approaches the source of sound.

From this formula s may be calculated

$$s = \frac{c(N - n)}{n} \quad 115$$

If, on the contrary, the observer recedes from the source of sound the signs are reversed and the Doppler formula is

$$N = n \left(1 - \frac{s}{c} \right) \quad 120$$

from which the speed s

$$s = \frac{c(n - N)}{n} \quad 125$$

may be calculated.

If, however, the source of sound (a signaling ship) approaches the observer (sup-

posed to be on a land station, or on another ship) the Doppler formula reads

$$N = \frac{cn}{e-s}$$

from which the unknown speed s

$$s = \frac{c(N-n)}{N}$$

of the source of sound may be calculated.

In case the source of sound recedes from the observer, the Doppler formula is

$$N = \frac{cn}{c+s}$$

and the speed s is

$$s = \frac{c(n-N)}{N}$$

As will be clear from the above statement, the speed can be immediately calculated by means of the indications given by the described apparatus if n , the number of vibrations of the tone produced by the submarine signaling device is known, as is the case with light-ships, or light-stations, or with ships having made a special arrangement to this effect. It is furthermore of advantage to write on the scale of the adjustable resonator not only the number of vibrations, but directly the speed per hour, as the limits between which the speed of a ship varies are very narrow, for a given type of ship. From this speed the type of ship in question may be immediately deduced, as the normal speed of different types has a determined value. For instance, a mail steamer has a speed of 10 knots per hour; a battle ship 18 knots; a cruiser or an express steamer 20 knots, and a torpedo vessel 30 knots. If by these means the velocity of the source of sound or of the observer is determined, the distance may be easily ascertained.

As the sea water is a good and uniform sound conductor, the range of audibility of the signals is a constant one for one and the same apparatus. If this range of audibility is known and is, say 50 km. it is clear that at the moment the annunciator device operates, the distance is equal to the radius of said range of efficiency.

If the moment at which the annunciator device operates has been noted, and the speed with which the source of sound or the observer moves has been calculated according to the Doppler principle, the distance at any given moment can be determined.

Let S be the maximum and constant range of audibility of the signals; D , the distance between the source of sound and the observer to be determined; s , the velocity of the ship; t , the time; then

$$D = S - st$$

whereby the distance at every moment can be determined.

I claim:

1. A receiver for submarine signaling apparatus, comprising a sub-aqueous casing, a sound detecting element therein set into vibration by transmitted sound waves, a resonator cooperating therewith and producing air vibrations corresponding thereto, a microphone producing fluctuations of current corresponding to said air vibrations, means to annunciate the incoming of sound waves, a telephonic arrangement capable of reproducing the sound waves picked up by the detecting element, means to rotate the casing in the direction of the incoming sound waves, an indicating device indicating the direction in which the casing has been rotated and means to determine the number of vibrations of the transmitted sound waves.

2. A receiver for submarine signaling apparatus, comprising a sub-aqueous casing, a sound detecting tube closed at its inner end and insulated from the casing, a chamber contained in the casing into which the closed end of said tube projects, said chamber being sound insulated from the casing, a resonator mounted on the closed end of the tube cooperating therewith and producing air vibrations corresponding to the sound waves, a microphone producing fluctuations of current corresponding to said air vibrations, an annunciator device for indicating the incoming sound waves, a telephonic arrangement to reproduce the sound waves picked up by the detecting device, means to rotate the casing in the direction of the incoming sound waves, an indicator device indicating the direction in which the casing has been rotated, and means to determine the number of vibrations of the reproduced sound waves.

3. A receiver for submarine signaling apparatus, comprising a sub-aqueous casing, a sound detecting tube closed at its inner end and insulated from the casing, a chamber contained in said casing into which the closed end of said tube projects, said chamber filled with a gas under a pressure greater than that of the surrounding medium and sound insulated from the casing, a resonator mounted on the closed end of the tube, cooperating therewith and producing air vibrations corresponding to the sound waves, a microphone structure producing fluctuations of current corresponding to said air vibrations, an annunciator device indicating the incoming sound waves, telephonic means to reproduce the sound waves picked up by the detecting device, means to determine the number of vibrations of said sound waves, means to rotate the casing in the direction of the incoming sound waves, and an indicator to indicate the direction in which the casing has been rotated.

4. A receiver for submarine signaling ap-

paratus, comprising a sub-aqueous casing, a sound detecting element therein set into vibration by transmitted sound waves, a resonator coöperating therewith and producing air vibrations corresponding thereto, a microphone producing fluctuations of current corresponding to said air vibrations, an annunciator for indicating the incoming sound waves picked up by the detecting element, means to indicate when said sound waves are of maximum intensity and the number of their vibrations, a tubular support for the casing, a gear mechanism to rotate the tubular support and the casing with a constant speed, and a hand connected with said rotating support indicating the position of the sound detecting element.

5. A receiver for submarine signaling apparatus, comprising a sub-aqueous casing, a sound detecting element therein set into vibration by transmitted sound waves, a resonator coöperating therewith and producing air vibrations corresponding thereto, a microphone producing fluctuations of current corresponding to said air vibrations, an annunciator indicating the incoming of sound waves, means to rotate the casing, an indicator to determine the direction in which the casing is rotated, telephonic means connected to said microphone and reproducing acoustical waves corresponding to the current fluctuations, an adjustable resonator in proximity to the telephone capable of being adjusted and tuned to resonance therewith, and means adjacent said resonator and acted upon by the vibrations therefrom to indicate the number of vibrations of the tone received and thereby determine the speed of the source of sound.

6. A receiver for submarine signaling apparatus, comprising a sub-aqueous casing, a sound detecting element therein set into vibration by transmitted sound waves, a resonator coöperating therewith and producing air vibrations corresponding thereto, a microphone producing fluctuations of current corresponding to said air vibrations, an annunciator indicating the incoming of sound waves, means to rotate the casing, an indicator to determine the direction of the sound waves, telephonic means connected to said microphone and reproducing acoustical waves corresponding to the current fluctuations, an adjustable resonator having an air outlet nozzle in proximity to the telephone capable of being adjusted and tuned to resonance therewith, a fan wheel pivotally mounted in proximity to the nozzle of said resonator, a spring to control the movement of said fan wheel, and an indicator thereon to indicate the degree of rotation of the wheel.

7. A receiver for submarine signaling ap-

paratus, comprising a sub-aqueous casing, a sound detecting element therein set into vibration by transmitted sound waves, a resonator coöperating therewith and producing air vibrations corresponding thereto, a microphone, in coöperative relation therewith producing fluctuations of current corresponding to said air vibrations, telephonic means to reproduce the sound waves picked up by the detecting device, indicators, to determine the number of vibrations and the direction of said sound waves and a second telephonic means in parallel with the first to operate an annunciating device.

8. A receiver for submarine signaling apparatus, comprising a sub-aqueous casing, a sound detecting element therein set into vibration by transmitted sound waves, a resonator coöperating therewith and producing air vibrations corresponding thereto, a microphone in coöperative relation therewith and producing fluctuations of current corresponding to said air vibrations, telephonic means to reproduce the sound waves picked up by the detecting element, indicators to determine the number of vibrations and the direction of the incoming waves, a second telephonic means in parallel with the first, a circuit actuated by said telephonic means and an annunciator device arranged in said circuit to operate when sound waves enter the detecting element.

9. A receiver for submarine signaling apparatus, comprising a sub-aqueous casing, a sound detecting element therein set into vibration by the transmitted sound waves, a resonator coöperating therewith and producing air vibrations corresponding thereto, a microphone in coöperative relation therewith and producing fluctuations of current corresponding to said air vibrations, telephonic means to reproduce the sound waves picked up by the detecting element, indicators to determine the number of vibrations and the direction of said incoming waves, a second telephonic means in parallel with the first, a circuit independent of the first telephonic means including a selenium cell and a relay, a permanent magnet, a mirror supported by the poles of said magnet, a source of light projecting its light onto the mirror, means actuated by the oscillations of the diaphragm of the second telephonic means to move the mirror to project varying quantities of light onto the selenium cell, and a signal actuated by the aforesaid relay to operate when the sound waves are picked up.

10. A receiver for submarine signaling apparatus, comprising a sub-aqueous casing, a sound detecting element therein set into vibration by transmitted sound waves, a resonator coöperating therewith and producing air vibrations corresponding thereto, a microphone in coöperative relation therewith

and producing fluctuations of current corresponding to said air vibrations, a telephonic means to reproduce the sound waves picked up by the detecting element, indicators to
5 determine the pitch and the direction of said incoming waves, a telephone in parallel with the first, a circuit including a selenium cell and a relay, a permanent magnet, a metallic mirror magnetically held to said magnet, a
10 lever arm operated by the diaphragm of the telephone, a source of light projecting its rays to said mirror, said mirror being positioned to reflect varying quantities of light to the cell to close said circuit by reason of
15 the movement imparted to said lever arm by the diaphragm of the telephone, and a signal, such as a bell, actuated by the aforementioned relay to announce that sound waves have been picked up.
20 11. A receiver for submarine signaling apparatus, comprising in combination, a sub-aqueous receiving device including a timed resonator, means to rotate the same to determine the maximum intensity of the sound
25 received and thereby the direction of said source of sound, means to convert the acoustical oscillations of said resonator into similar electrical oscillations, means for transforming said electrical oscillations into similar light vibrations, means to re-transform
30 said light vibrations into reinforced electrical vibrations, means to produce acoustical vibrations from said retransformed electrical oscillations, and means to determine the

pitch or number of vibrations of said latter 35
acoustical vibrations.

12. A sub-aqueous signaling system comprising a sub-aqueous sound conductor responsive to a musical tone, a resonator connected thereto, and through which said tone 40
is filtered, means actuated by said resonator responsive to said tone for producing electrical vibrations of the same frequency, and a receiving apparatus responsive to and operated by said synchronous electrical vibrations. 45

13. A sub-aqueous signaling system comprising a sub-aqueous sound conductor responsive to a musical tone, a resonator connected thereto and through which said tone 50
is filtered, means actuated by said resonator responsive to said tone for producing electrical vibrations of the same period, a telephone operated by said electrical vibrations, a regulable resonator coöperating with said 55
telephone whose adjustments for resonance are a measure of the increase or decrease of the number of vibrations of the tone received, and a scale to indicate the vibrations of the tone received and when the resonator 60
is adjusted.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

DR. JOSEF SCHIESSLER.

Witnesses:

JOSEF RUBARCHOE,
AUGUST FUGGER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

BRAKE FOR TALKING MACHINES,
#1,204,859-----W. F. Grupe,
Patented-November 14th, 1916.
Filed-August 15th, 1914.

W. F. GRUPE.
 BRAKE FOR TALKING MACHINES.
 APPLICATION FILED AUG. 15, 1914.

1,204,859.

Patented Nov. 14, 1916.

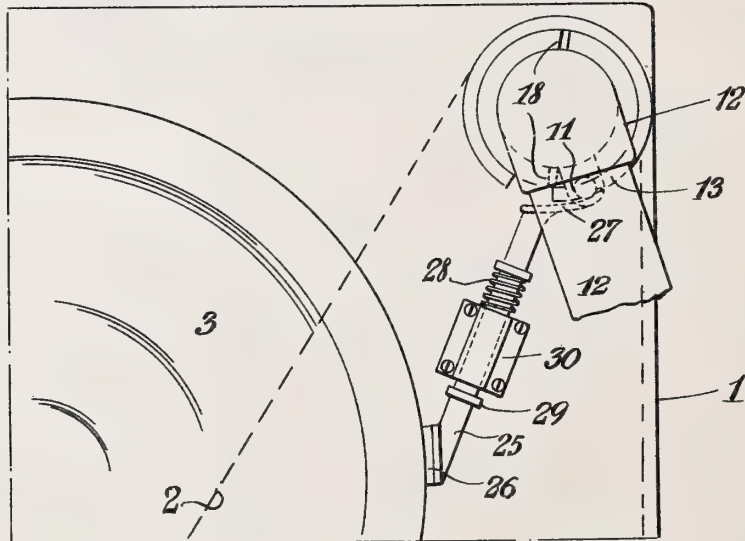


Fig. 1

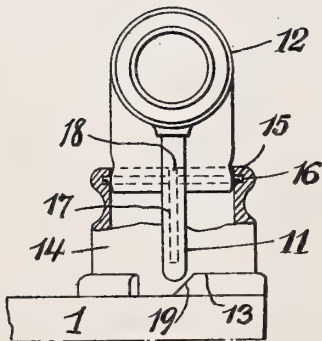


Fig. 2

William F. Grupe ^{Inventor}
 By his Attorneys
 Nestick & Lucke

UNITED STATES PATENT OFFICE.

WILLIAM F. GRUPE, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO VANOPHONE COMPANY, INC.

BRAKE FOR TALKING-MACHINES.

1,204,859.

Specification of Letters Patent. Patented Nov. 14, 1916.

Application filed August 15, 1914. Serial No. 856,914.

To all whom it may concern:

Be it known that I, WILLIAM F. GRUPE, a citizen of the United States of America, and residing at Jersey City, county of Hudson, State of New Jersey, have made certain new and useful Improvements in Brakes for Talking-Machines, of which the following is a specification.

This invention relates to brakes for talking machines, phonographs and the like.

An object of my invention is to provide suitable mechanism for automatically braking the rotating table of a talking machine, phonograph or the like, and preferably by suitable provision of means whereby the rotating table is arrested when the movable arm is moved to its "off" or non-playing position, and to release the brake when the movable arm is moved from its "off" or non-playing position. Also, preferably such provision of means comprises an extension or projection coöperating with the braking member and serving to support the movable arm when in such "off" or non-playing position. In such preferred forms of my invention, the movable arm is provided with reliable means for supporting the same when in such "off" or non-playing position and the weight of the movable arm is utilized to advantage in maintaining the braking member in its braking position.

Other features and objects of my invention will be more fully understood from the following description and accompanying drawings, in which—

Figure 1 is a top plan view of one form of my invention; and Fig. 2 is a detail front elevation of the movable arm and extension carried thereby and certain other parts shown in Fig. 1.

Referring to Fig. 1, the movable tone arm 12 is shown as mounted onto a hollow standard or socket 14 projecting upwardly above the base or support 1. Preferably, such mounting is constructed to permit swinging of the tone arm in a substantially horizontal plane and to also permit to a limited extent oscillatory movement of the tone arm transversely to the horizontal plane. To effect such movement, the tone arm may be provided with the oppositely disposed, laterally extending circular lugs 15, 15, adapted to be received within the annular groove 16 disposed within the standard or socket 14. The

portion of the tone arm 12 circumferentially adjacent said lugs 15 is preferably spheroidal or otherwise curved and the diameter of each said lugs 15 is slightly less than the width of said groove 16, whereby to permit the conjoint horizontal and vertical movement of the tone arm 12.

One or more slot openings 18 may be provided for securing the entry of each lug 15 into the annular groove 16, as will be understood, and the partial slots 17 extending lengthwise of the standard or socket 14 may be provided for purposes of imparting resiliency to the upper portions of the standard or socket 14.

The extension or projection 11 is shown as carried rigidly by the swinging arm 12 and extending substantially transverse to the direction of length of the swinging arm 12. The step 13, preferably having the inclined approach 19, is provided to support the extension or projection 11 when the swinging arm is in its "off" or non-playing position. Such step 13 is shown in fixed relation to the base 1 and extending from the standard or mounting means of the swinging arm.

Referring to Fig. 1, the brake member 25 is shown as a substantially straight rod carrying at its forward end the friction pad 26 adapted to be brought in suitable braking relation with the turntable 3, when the braking member 25 is in braking position. The rearward end of the braking member 25 is provided with the extension 27 carrying a hook or other eccentric means coöperating with said projection or extension 11 whereby when the swinging arm 12 is in "off" or non-playing position, said braking member 25 is moved into braking position. The braking member 25 is also shown provided with resilient means, such as the spring 28, normally tending to move the braking member into non-braking position. The stop 29, shown carried by the braking member 25, limits the movement of the braking member from its braking position. The braking member 25 is shown mounted within the guide or sleeve 30, fixed to the base or support 1. Thus, as the swinging arm 12 is moved into its "off" or non-playing position, the extension or projection 11, in eccentric relation to the hook of the extension 27 causes the braking member 25, in opposition

to the resilient means 28, to move into braking position, and upon movement of the swinging arm 12 from its "off" or non-playing position, the extension or projection 11 is moved free of the hook 27 and permits the spring 28 to move the braking member 25 into its non-braking position, determined by the stop 29 encountering a face of the sleeve 30. When the swinging arm 12 is in its "off" or non-playing position the extension or projection 11 will have rested upon the step 13.

As will be seen from the above, my invention is advantageous in securing a positive braking and non-braking of the turntable whenever desired without the use of auxiliary releasing and unreleasing means for braking the rotating table. Also, the positive and direct support for the movable arm insures security of the same when in its "off" or other non-playing position.

Whereas I have described my invention by reference to specific forms thereof, it will be understood that many changes and modifications may be made without departing from the scope of my invention.

What I claim and desire to secure by Letters Patent is:—

1. The combination with a base, a rotatable table carried thereby, a swinging arm, a movable brake member adapted when in braking position to engage said table, resilient means for normally drawing said braking member from engagement with said table, an eccentric element carried by said braking member, a projection controlled by said swinging arm and adapted when said arm is in a predetermined position to engage said eccentric element to move said braking element into braking position and means cooperating with said projection to support said arm when said arm is in said predetermined position.

2. The combination with a base, of a rotatable table carried thereby, a swinging arm mounted on said base, a movable braking member mounted on said base, resilient means normally moving said braking member in a direction to effect disengagement with said table, a stop limiting the movement of said braking member in said direction, a hook carried by said braking member, a projection carried by said swinging arm and adapted to engage said hook when said arm is in off position and thereby move said braking element into engagement with said table, and means fixed to said base for supporting said projection and thereby support said arm when said arm is in off position.

3. The combination with a base, of a rotatable table carried thereby, a swinging arm mounted on said base, a reciprocating braking member, means for mounting said braking member on said base, resilient

means tending to move said braking member in a certain direction out of engagement with said table, a stop limiting the movement of said braking member in said certain direction, a projection carried by said arm and adapted to engage said braking member when said arm is in a predetermined position and move said braking member in opposition to said resilient means into engagement with said table and means in fixed relation to said base for supporting said projection and thereby supporting said arm when said arm is in said predetermined position.

4. The combination with a base, of a rotatable table carried thereby, a swinging arm, means for mounting said swinging arm onto said base, a movable braking member adapted to reciprocate in the direction of its length, a sleeve mounted on said base and controlling the movement of said braking member, a pad at one end of said braking member adapted to arrest said table when said braking member is in braking position, resilient means tending to move said braking member in a certain direction out of braking position, a stop limiting the movement of said braking member in said certain direction, a hook carried by said braking member, a projection extending downwardly from said swinging arm and adapted when said arm is in off position to engage said hook and move said braking member into braking position and means cooperating with said projection to support said arm when said arm is in off position.

5. The combination with a base, of a rotatable table carried thereby, a swinging arm, means for mounting said swinging arm onto said base, a braking member formed of a straight arm, a friction pad carried at one end of said arm, a hook positioned at the opposite end of said arm, a sleeve enveloping said arm, resilient means tending to move said arm out of braking position, a stop carried by said arm, a projection extending from said swinging arm and adapted to engage said hook to move said braking member into braking position when said arm is in off position and means cooperating with said projection to support said arm when in off position.

6. The combination with a base, of a rotatable table carried thereby, a swinging arm, means for mounting said arm on said base, a braking member, a pad carried by said braking member and adapted to arrest said table when said braking member is in braking position, an element carried by said arm and adapted when said arm is in off position to move said braking member into braking position and means for supporting said arm when in off position.

7. The combination with a base, of a ro-

tatable table carried thereby, a swinging arm, means for mounting said swinging arm onto said base, a braking member, a pad carried by said braking member and adapted to arrest said table when said braking member is in braking position, a cam carried by said swinging arm and adapted when said swinging arm is in off position to move said braking member into braking position and means for supporting said swinging arm when in off position.

8. In a device of the class described, the combination of a frame, a revoluble record carrying support on said frame, a needle carrying arm adapted to be moved into positions where the needle engages the record or clears the periphery thereof, and a locking device for locking said record support, apparatus for operating said device, including a pin carried by the arm and a hook carried by the locking device, said locking device being provided with a body portion which is out of the path of movement of the pin carried by the arm, said pin engaging said hook and operating the locking device to lock the record support when the arm has been moved to a position where the needle clears the periphery of the record.

9. The combination with a rotatable table, of a swinging tone arm, a base supporting said table, a brake mounted on said base, resilient means tending to move said brake in a certain direction to effect non-braking, a stop positioned on said base limiting the movement of said brake in said certain direction, a hook carried by said brake and a projection carried by said swinging tone arm arranged to engage said hook when said swinging tone arm is in non-playing position to thereby move said brake into braking position.

10. The combination with a rotatable table, of a swinging tone arm, a base supporting said table, a reciprocating braking member mounted on said base, resilient means tending to move said braking member in a certain direction to effect non-braking, a stop positioned on said base limiting the movement of said braking member in said certain direction, a hook carried by said braking member and a projection carried by said swinging tone arm arranged to engage said hook when said tone arm is in off position to thereby move said braking member into braking position.

11. The combination with a rotatable table, of a swinging tone arm, a base supporting said table, a brake mounted on said base, resilient means tending to move said brake in a certain direction to effect non-braking, a stop positioned on said base, a stop carried by said brake and adapted to engage said stop on said base to limit the movement of said brake in said certain direction, a hook carried by said brake and a projection carried by said swinging tone arm arranged to engage said hook when said swinging tone arm is in non-playing position to thereby move said brake into braking position.

12. The combination with a base, of a rotatable table carried thereby, a swinging arm, a braking member, resilient means for moving said braking member into non-braking position, a stop limiting the non-braking movement of said braking means, means carried by said swinging arm for actuating said braking member into braking position and means for supporting said swinging arm when in off position.

13. The combination with a base, of a rotatable table, a swinging arm carried by said base, a braking member, resilient means for moving said braking member into non-braking position, a stop limiting the non-braking movement of said braking means, means carried by said swinging arm for actuating said braking member into braking position and means for supporting said swinging arm when in off position.

14. The combination with a base, of a rotatable table, a swinging arm, means for mounting said swinging arm onto said base, a braking member, resilient means for moving said braking member into non-braking position, said mounting means acting as a stop to limit the non-braking movement of said braking member, a projection carried by said swinging arm for moving said braking member into braking position and means for supporting said projection and therewith said swinging arm when in off position.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIAM F. GRUPE.

Witnesses:

HENRY J. LUCKE,
SOPHIE M. BAEDER.



UNIVERSALLY FLEXIBLE BRAKE,
#1,204,860-----W. F. Grupe,
Patented-November 14th, 1916.
Filed-February 20th, 1915.

W. F. GRUPE.
 UNIVERSALLY FLEXIBLE BRAKE.
 APPLICATION FILED FEB. 20, 1915.

1,204,860.

Patented Nov. 14, 1916.

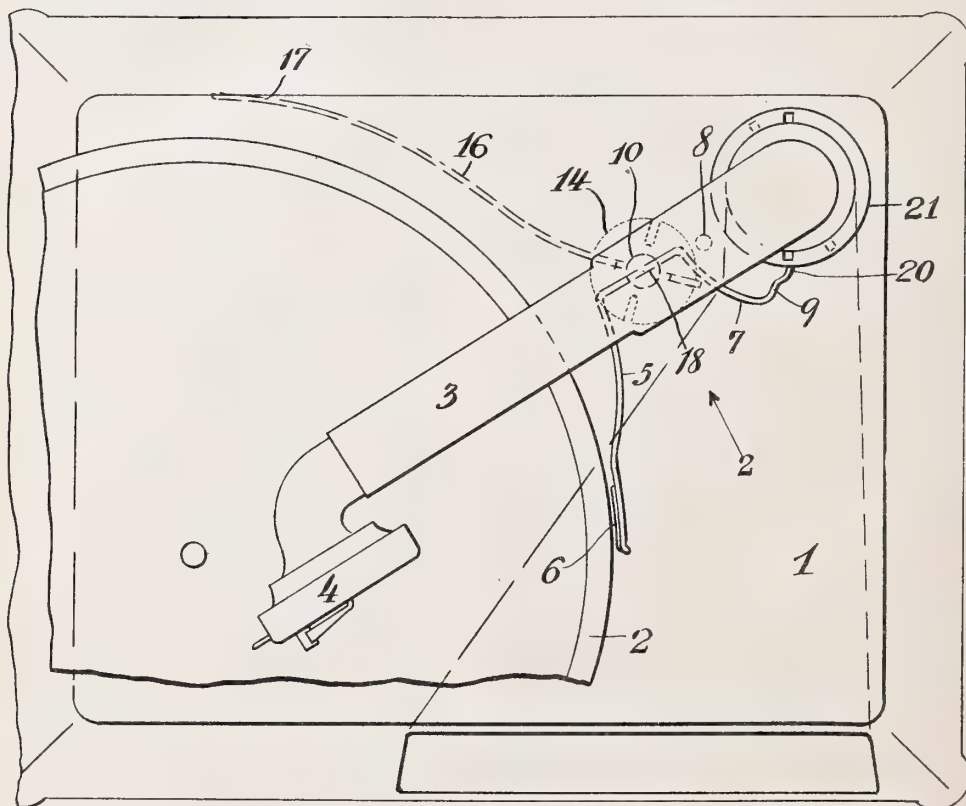


Fig. 1

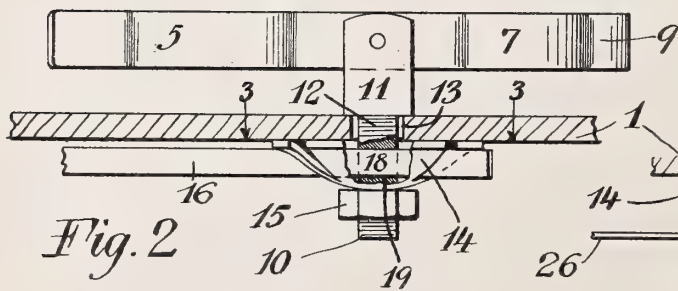


Fig. 2

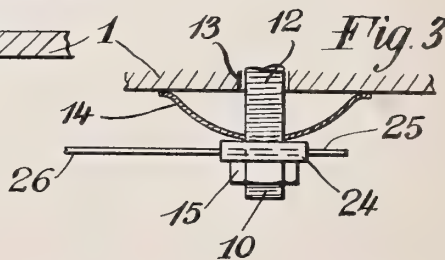


Fig. 3

Witnesses:
 S. M. Baider
 W. G. Leard

William F. Grube Inventor
 By his Attorneys
 Hestick & Lucke

UNITED STATES PATENT OFFICE.

WILLIAM F. GRUPE, OF JERSEY CITY, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO VAN-O-PHONE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

UNIVERSALLY-FLEXIBLE BRAKE.

1,204,860.

Specification of Letters Patent.

Patented Nov. 14, 1916.

Application filed February 20, 1915. Serial No. 9,611.

To all whom it may concern:

Be it known that I, WILLIAM F. GRUPE, a citizen of the United States, residing at Jersey City, Hudson county, State of New Jersey, have invented certain new and useful Improvements in Universally-Flexible Brakes, described more particularly herein and illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of one embodiment of my invention; Fig. 2 is a detail side elevation of parts of Fig. 1, as viewed in the direction of arrow 2; and Fig. 3 is a detail plan view on the line 3—3 of Fig. 2, and also showing a modification.

According to the drawings, the casing 1 of the phonograph or talking machine is of any construction. The turntable 2 shown mounted toward one side of the casing 1, is driven by suitable mechanism (not shown). The movable tone arm 3 carrying the sound box 4 is illustrated as oscillatably mounted toward the opposite end of the casing 1.

The braking means comprises the following. The arm 5, preferably carrying a friction pad 6, is actuated by the arm 7, whereby the turntable 2 is brought to rest upon movement of the movable tone arm 3 into a predetermined position, such as its non-playing position. Preferably the arm 5 and the arm 7 are constructed as integrally connected to each other and preferably of resilient material. To effect the above relation of parts I have shown the projection 8 carried by the movable tone arm 3 and adapted, when the tone arm 3 is in non-playing position, to engage the hook end 9 of arm 7 and thereby move the friction pad 6 into braking position. The bar 5, 7, is shown carried by the stud 10 having the enlarged head 11 and stem 12 passing through the opening 13. The stud 13 is flexibly positioned by means of the resilient element 14 shown as a spring washer, and held in position relatively to the top wall of the casing 1 by means of the adjustable nut 15. Means are provided for biasing the brake means 5, 7, in such direction that the effective braking end or friction pad 6 is normally held from engagement with the turntable 2. As an illustration thereof, I have shown the spring arm 16 engaging at its portion 17 against a fixed part, such as the inner face of a wall

of casing 1, and having another portion 18 related to the stud 10, whereby stud 10 tends to twist in the desired rotational direction to hold the arm 5 out of contact with the turntable 2. For simplicity of assembly and construction the portion 18 projects through recesses of the washer 14 and through the slot 19 of the stud 10. The hook portion 9 of brake arm 7 is preferably provided with the abutment portion 20 adapted normally to engage the fixed collar or base 21 of the tone arm 3.

In accordance with the described specific construction, the effective braking end or friction pad 6 will be thrown into engagement with the turntable 2 when the movable tone arm 3 is positioned in its non-playing position, to wit, by means of the projection 8 and hook 9. When the movable tone arm 3 is moved out of its non-playing position, the spring 16 forces the abutment portion 20 into engagement with the fixed collar 21, thereby moving the effective braking end or friction pad 6 out of contact with the turntable 2. Upon release of the turntable from the brake, the motor mechanism is permitted to drive the turntable under the speed conditions determined by the speed regulating means.

It will be noted that my invention results in a brake which is universally yieldable, that is, yieldable in all directions. Such construction is advantageous in reducing breakage of the brake parts to a minimum, and is of particular value in reducing the cost of breakage during assembly. The construction is also of value in that the assembly of the parts can be formed, most readily even by unskilled labor, since the self-adjustability of the parts does not require especial skill or repeated trials for attaining the desired results.

In a similar manner, the universally yieldable features of my invention, wholly or partly, operates to brake the rotating element of the device when the tone arm, or other swinging member is in any predetermined position or positions other than the non-playing or non-operative position. Such result may be attained, in a similar manner, by providing the stud or similar pivotal supporting means of the brake proper, with an enlarged opening through which it passes and a resilient righting means similar to the spring washer, for

righting the stud to its normal operating position, in the event that blows, shocks or the like be encountered by the brake proper. Other means may be provided, similar to the
 5 spring 16 for normally holding the brake proper out of braking position.

Whereas I have described my invention by reference to specific forms thereof, it will be understood that many modifications and
 10 changes may be made without departing from the spirit of my invention. Thus the slot in the stem 12 of stud 10 may be positioned below the flexible washer 14, and a collar or disk 24 provided with a perfora-
 15 tion, through which perforation and slot the spring arm or wire 26 is passed, and thereby locking the collar or disk 24 on the stud 10. If desired, the threaded nut 15 may be also used.

20 What I claim and desire to secure by Letters Patent is:—

1. The combination with a rotating element, of a swinging element cooperating therewith, a fixed base for said rotating element and said swinging element, a brake
 25 controlling said rotating element when said swinging element is in a predetermined position, a stud passing through an opening in said fixed base supporting said brake, the
 30 dimension of said opening in a certain direction being greater than the corresponding dimension of said supporting stud, a resilient element extending from a portion of said supporting part to said fixed base, and
 35 a spring extending from a fixed point controlling the rotational movement of said supporting part.

2. The combination with a rotating element, of a swinging element, a fixed base for
 40 said rotating element and said swinging element, a brake controlling said rotating element when said swinging element is in a predetermined position, a stud passing through an opening in said fixed base sup-
 45 porting said brake, the dimension of said opening in a certain direction being greater than the corresponding dimension of said stud, said stud being provided with a recess, and a resilient element extending from said
 50 fixed base through said recess.

3. The combination with a rotating element, of a swinging element, a base carrying said rotating element and said swinging
 55 element, a brake controlling said rotating element, a stud carrying said brake and

provided with a recess, said base being provided with an opening through which said stud extends and having a dimension greater than the corresponding dimension of said
 60 stud, a flexible washer connecting said stud with said base, and a flexible arm extending from said base and through said recess and tending normally to move said brake in a direction away from said rotating element.

4. The combination with a rotatable table, 65
 of a swinging tone arm, a base supporting said table, a pivoted reciprocating braking member mounted on said base, resilient means having one end in fixed relation to
 70 said base and its other end engaging said braking member to thereby tend to move said braking member in a certain direction to effect non-braking, a stop positioned on said base limiting the movement of said
 75 braking member in said certain direction, a hook controlling said braking member and a projection in fixed relation to said swinging tone arm arranged to engage said hook when said swinging tone arm is in non-play-
 80 ing position to thereby move said braking member into braking position.

5. The combination with a rotatable table, 85
 of a swinging tone arm, a base supporting said table, a braking member pivoted onto said base, said braking member having a part extending angularly with respect to another part of said braking member, a friction pad carried by said first named part
 90 of the braking member, resilient means having one end abutting said base and its other end engaging said braking member thereby tending to move said braking member in a certain direction to effect non-braking, a stop positioned on said base limiting the
 95 movement of said braking member in said certain direction, a hook carried by said other part of the braking member and a projection carried by said swinging tone arm arranged to engage said hook when said swinging tone arm is in non-playing position
 100 to thereby move said braking member into braking position.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIAM F. GRUPE.

Witnesses:

HENRY J. LUCKE,
 K. G. LE ARD.

BRAKE FOR TALKING MACHINES AND THE
LIKE,

#1,204,861-----W. F. Grupe,
Patented-November 14th, 1916.
Filed-January 25th, 1916.

W. F. GRUPE.
BRAKE FOR TALKING MACHINES AND THE LIKE.
APPLICATION FILED JAN. 25, 1916.

1,204,861.

Patented Nov. 14, 1916.

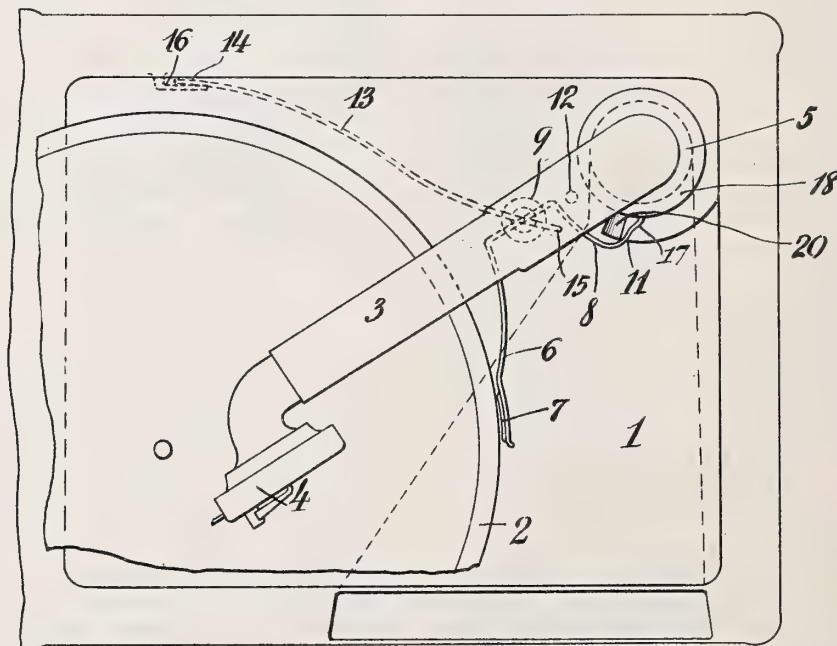


Fig. 1

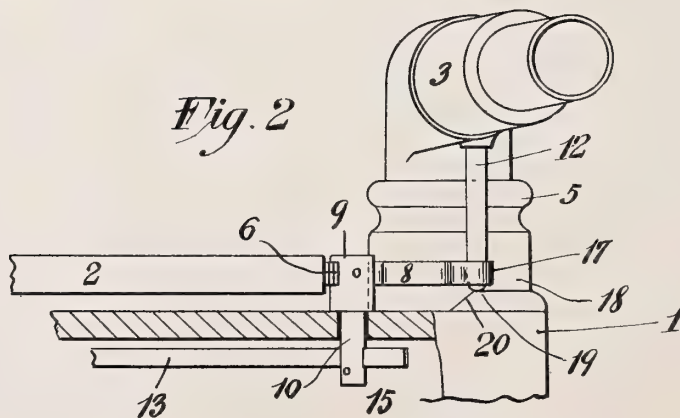


Fig. 2

William F. Grupe Inventor
By his Attorneys
Hodick & Lucke

UNITED STATES PATENT OFFICE.

WILLIAM F. GRUPE, OF NORTH BERGEN, NEW JERSEY.

BRAKE FOR TALKING-MACHINES AND THE LIKE.

1,204,861.

Specification of Letters Patent.

Patented Nov. 14, 1916.

Application filed January 25, 1916. Serial No. 74,086.

To all whom it may concern:

Be it known that I, WILLIAM F. GRUPE, a citizen of the United States, and a resident of North Bergen, county of Hudson, State of New Jersey, have invented certain new and useful Improvements in Brakes for Talking-Machines and the like, of which the following is a description.

This invention relates to brakes for talking machines, phonographs, graphophones and like apparatus and is particularly directed to brakes comprising a braking member adapted to arrest the turn table by co-operation with suitable means whereby said braking member is brought into braking position when the swinging tone arm is in a predetermined position. Preferably such coöperating means includes means whereby the swinging tone arm is supported when in such predetermined position.

Other features and objects of the invention will be more fully understood from the following description in which—

Figure 1 is a top plan view showing one form of my invention; and Fig. 2 is a detail vertical sectional elevation of Fig. 1.

Referring to the drawings, the base 1 is of any approved construction. The turn table 2 is shown supported on a preferably central shaft and may be driven by clock work mechanism or other type of motor. The swinging tone arm 3 carrying the reproducer 4 is shown mounted on the standard 5 fixed to and projecting upwardly from the base 1. It will be noted that the record is placed upon the turn table 2 and the stylus of the reproducer 4 brought in suitable relation to the record to effect the desired reproduction.

The braking member is shown comprising the forward or braking arm 6 carrying the friction pad 7 and further comprising the rearward arm 8, the latter being preferably in fixed relation to said forward arm 6. The braking member 6, 8 as a whole is shown pivoted onto the stud 9 extending through the opening 10 within the upper plate of base 1. Such pivotal mounting means for the braking member secures reciprocatory movement of the braking member.

The rearward arm 8 is provided with the hook 11, and the projection 12, shown extending downwardly from in fixed relation to the swinging tone arm 3, coöperates with said hook 11 whereby the braking member is moved into braking position when the swing-

ing tone arm 3 is moved into off position. The resilient member 13, shown as a flat spring, normally tends to turn the stud 9 in the direction to move the braking member into non-braking position. The resilient member 13 is shown having its end 14 abutting the inner wall of the base 1, and having its free end 15 extending through a slot in the stud 9. If desired the end 14 of resilient member 13 may be secured within the pocket 16.

The rearward arm 8 of the braking member is preferably provided with the stop portion 17 adapted to engage a lower portion 18 of the base of the standard 5, under action of the resilient member 13 when the swinging tone arm 3 is in playing position. Preferably, the projection 12 supports the swinging tone arm when in off or non-playing position, and to this end, the step 19 is provided, whereby the moving tone arm is held in somewhat elevated position. The step 19 is shown as an extension projecting laterally at the base of the standard 5, and may be provided with the inclined surface 20 to guide the projection into proper position onto the step 19 when the swinging tone arm 3 is moved into off position.

The resilient member 13 is shown disposed below the upper plate of the casing 1, for the purpose of eliminating, as far as possible, the protruding parts on the top of the base 1. The resilient member 13 may constitute the sole resilient portion of the braking arrangement, although, if desired, the braking member and particularly the forward arm 6 and rearward arm 8, may also be constructed of resilient material, such as stamped metal.

Whereas I have illustrated my invention by reference to specific forms thereof, it will be understood that many changes and modifications may be made without departing from the spirit of my invention.

What I claim and desire to secure by Letters Patent is:—

1. The combination with a rotatable table and a swinging arm, of mounting means for said swinging arm, a brake lever having one end adapted to engage said rotatable table, an extension carried by said swinging arm and adapted to engage said brake lever when the said swinging arm is in a predetermined position to thereby effect engagement of said one end of the lever with said rotatable table and means for supporting said exten-

sion and said swinging arm when said swinging arm is in said predetermined position.

2. The combination with a base, of a rotatable table carried thereby, a swinging arm, means for mounting said swinging arm on said base, a brake lever mounted on said base, one end of said brake lever being adapted to engage said rotatable table, means carried by said swinging arm for engaging said brake lever when said swinging arm is in a predetermined position to thereby effect engagement of said one end of the lever with said rotatable table, said means comprising a member extending from said swinging arm toward said base and a support positioned on said base to support said extension and therewith said swinging arm when said swinging arm is moved to said predetermined position.

3. The combination with a base, of a rotatable table carried thereby, a swinging arm, means for mounting said swinging arm on said base, a brake lever mounted on said base, one end of said brake lever being adapted to engage said rotatable table, a member carried by said swinging arm and adapted to engage said brake lever when

said swinging arm is in a predetermined position to thereby effect engagement of the said one end of the lever with said rotatable table, and a support positioned on said base to support said extension and therewith said swinging arm when the said swinging arm is moved to said predetermined position.

4. The combination with a base, of a rotatable table carried thereby, a swinging arm, means for mounting said swinging arm onto said base, a braking member having a bent portion, a friction pad carried by said bent portion and adapted to arrest said table when said braking member is in braking position, oscillating mounting means for said braking member, a hook carried by said braking member, a projection extending from said swinging arm and adapted to engage said hook to move said braking member into braking position when said arm is in off position and means co-operating with said projection to support said arm when in off position.

In testimony whereof I have signed this specification.

WILLIAM F. GRUPE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

ATTACHMENT FOR TALKING
MACHINES,

#1,205,407-----W. T. Sullivan,
Patented-November 21, 1916.
Filed-November 26th, 1915.

W. T. SULLIVAN.
ATTACHMENT FOR TALKING MACHINES.
APPLICATION FILED NOV. 26, 1915.

1,205,407.

Patented Nov. 21, 1916.

Fig. 1.

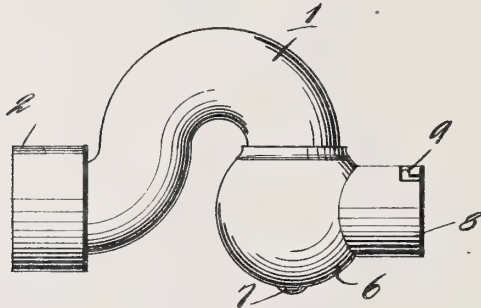


Fig. 2.

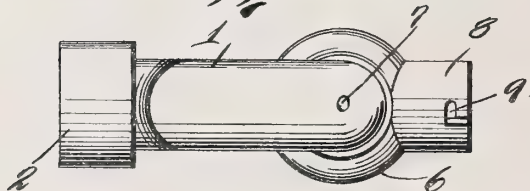


Fig. 3.

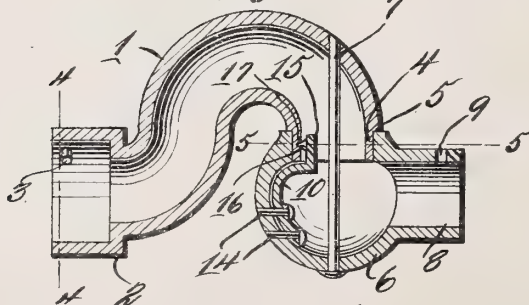


Fig. 4.

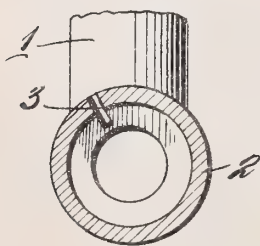


Fig. 5.

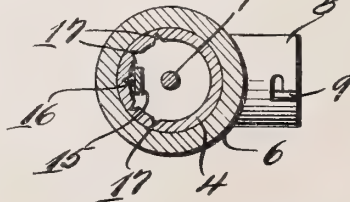
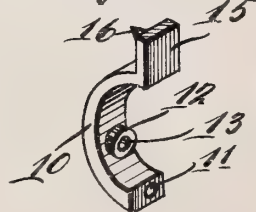


Fig. 6.



Inventor

Witnesses

M. L. Rector
M. L. Rector

W. T. Sullivan

By *E. C. Trooman & Co.*
his Attorney &.

UNITED STATES PATENT OFFICE.

WOODRUFF T. SULLIVAN, OF NORWICH, CONNECTICUT.

ATTACHMENT FOR TALKING-MACHINES.

1,205,407.

Specification of Letters Patent.

Patented Nov. 21, 1916.

Application filed November 26, 1915. Serial No. 63,583.

To all whom it may concern:

Be it known that I, WOODRUFF T. SULLIVAN, a citizen of the United States, residing at Norwich, in the county of New London and State of Connecticut, have invented certain new and useful Improvements in Attachments for Talking-Machines, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to phonographs and like machines and has for its principal object the production of a simple and efficient attachment therefor, which will allow all makes of records to be played thereby.

Another object of this invention is the production of an attachment for phonographs wherein the socket is pivotally and adjustably mounted so that it may be swung to a desired position for playing various and all makes of records.

Another object of this invention is the production of an attachment for talking machines wherein a spring member is provided which is adapted to retain the socket member in an adjusted set position after this socket member has been swung to the desired position.

With these and other objects in view this invention consists of certain novel combinations, constructions, and arrangements of parts as will be hereinafter fully described and claimed.

In the accompanying drawing: Figure 1 is a side elevation of the attachment for talking machines. Fig. 2 is a top plan view of the attachment. Fig. 3 is a central longitudinal section through the attachment. Fig. 4 is a section taken on the line 4—4 of Fig. 3. Fig. 5 is a section taken on the line 5—5 of Fig. 3. Fig. 6 is a detail perspective view of the spring.

Referring to the accompanying drawing by numerals it will be seen that only the specific construction of the attachment has been disclosed herein, as it is not deemed necessary to disclose the construction of a talking machine. It will be seen that the attachment comprises a curved neck 1 which is formed so as to provide a substantially goose neck construction. At one end of the neck 1 there is provided an enlarged sleeve 2 formed integral thereon, and provided with the inwardly extending pin 3. This sleeve 2 is adapted to fit upon a talking ma-

chine for allowing a portion of the talking machine, such for instance as the reproducer carrying tube, to fit within the sleeve 2, at which time the pin 3 can pass within an ordinary bayonet slot. The opposite end of the neck 1 is reduced, as shown at 4, to provide the abutment shoulder 5.

The socket member 6 is constructed so as to present a bulbous structure having one end portion open so as to fit upon the reduced portion 4 of the neck 1 and abut against the shoulder 5. The pin 7 passes through the socket portion 6 and upwardly into engagement with the neck 1. In this manner it will be seen that the socket 6 will be positively retained in engagement with the neck 1 although the same will be allowed to be swung when desired. A hollow projection 8 extends from one side portion of the socket 6 and is provided with a bayonet slot 9, so as to allow the reproducer of the talking machine to be positioned in engagement therewith and allowing an ordinary pin which may be carried by the reproducer to fit within the slot 9 for holding the same in engagement with the socket 6. It will be noted by referring particularly to Fig. 3, that the sound passes from the reproducer through the projection 8 and into the interior of the socket 6 so as to pass through the neck 1 and thence into the talking machine.

In order to retain the socket 6 in a desired set position there is provided a spring 10, the construction of which is clearly shown in Fig. 6. This spring 10 is formed of resilient flat metal and is bowed throughout its entire length. An opening 11 is formed at one end thereof, while within the bowed portion of the spring there is provided a neck 12 having an opening 13. This spring 10 is bowed so as to conform in contour to the inner shape of the socket 6 at which time the retaining rivets 14 may be passed through the openings 11 and 13 and into engagement with the socket 6 for fixedly retaining the spring in its correct position within the socket. One end of the spring 10 is bent to provide an ear 15 upon which there is formed a pointed lug 16. The reduced portion of the neck 1 is provided upon its inner surface with a plurality of pockets 17 which are formed so as to be in the path of travel of the lug 16 as the socket is swung in a desired direction.

As is well known the Columbia and Victor

records are formed by the lateral process while Edison records are formed by the hill and dale process.

When this attachment is in use the sleeve 5 will engage the talking machine, as hereinbefore set forth, while the reproducer is carried by the projection 8. When the socket is in its normal position, that is, when the projection 8 extends in alinement 10 with the sleeve 2, it will allow the regular Victor and Columbia records to be played. If so desired, however, the attachment will allow an Edison record to be played with an ordinary steel needle, simply by turning 15 the socket to the necessary angle. In either instance, the socket will be retained in a set position by the fitting of the lug within one of the pockets 17. Therefore, this attachment, after being placed in position does not 20 have to be removed since it will allow all kinds and makes of records to be played. It is, of course, obvious that this attachment may be made of any suitable or desired metal, with the exception of the spring 10 25 which is preferably of spring steel, so that when the device is assembled any danger of the same becoming broken or becoming out of order is greatly reduced.

It is not intended to limit the construction 30 of this attachment to the specific form as herein disclosed, but to include all such devices as properly come within the scope of the invention as presented by the claims.

What is claimed is:

35 1. In an attachment of the class described, the combination of a neck, said neck being adapted to be carried by a talking machine, said neck having a reduced end thereby forming an abutment shoulder, a socket 40 pivotally mounted upon said reduced end,

means for holding said socket upon said reduced end, whereby said socket will be permitted to move in a horizontal plane, said reduced end having internal horizontally 45 alined pockets, and a flat spring fixedly secured to said socket, a lug carried by said spring and removably fitting in a selected pocket, said spring extending in a plane at right angles to the line movement of said 50 socket, whereby said spring will be firm in action for more positively holding said socket against accidental movement.

2. In an attachment of the class described, the combination of a neck, said neck being adapted to be carried by a talking machine, 55 said neck having a reduced end thereby forming an abutment shoulder, a socket pivotally mounted upon said reduced end, means for holding said socket upon said reduced end, whereby said socket will be permitted to move in a horizontal plane, 60 said reduced end having internal horizontally alined pockets, a flat spring positioned within said socket, an ear extending from one end of said spring, a lug 65 formed upon said ear, rivets passing through said spring and engaging said socket, thereby fixedly supporting said spring in a vertical position, said lug being adapted to removably fit within a selected 70 pocket, said spring extending at right angles to the line of movement of said socket, whereby strain upon said spring will take place across the breadth thereof, whereby said spring will be firmly supported so 75 as to positively resist accidental movement of said socket.

In testimony whereof I hereunto affix my signature.

WOODRUFF T. SULLIVAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

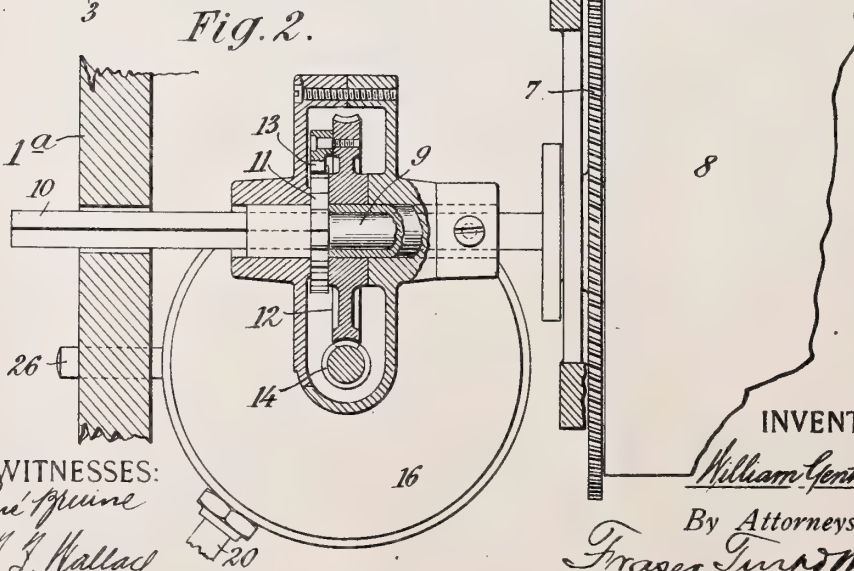
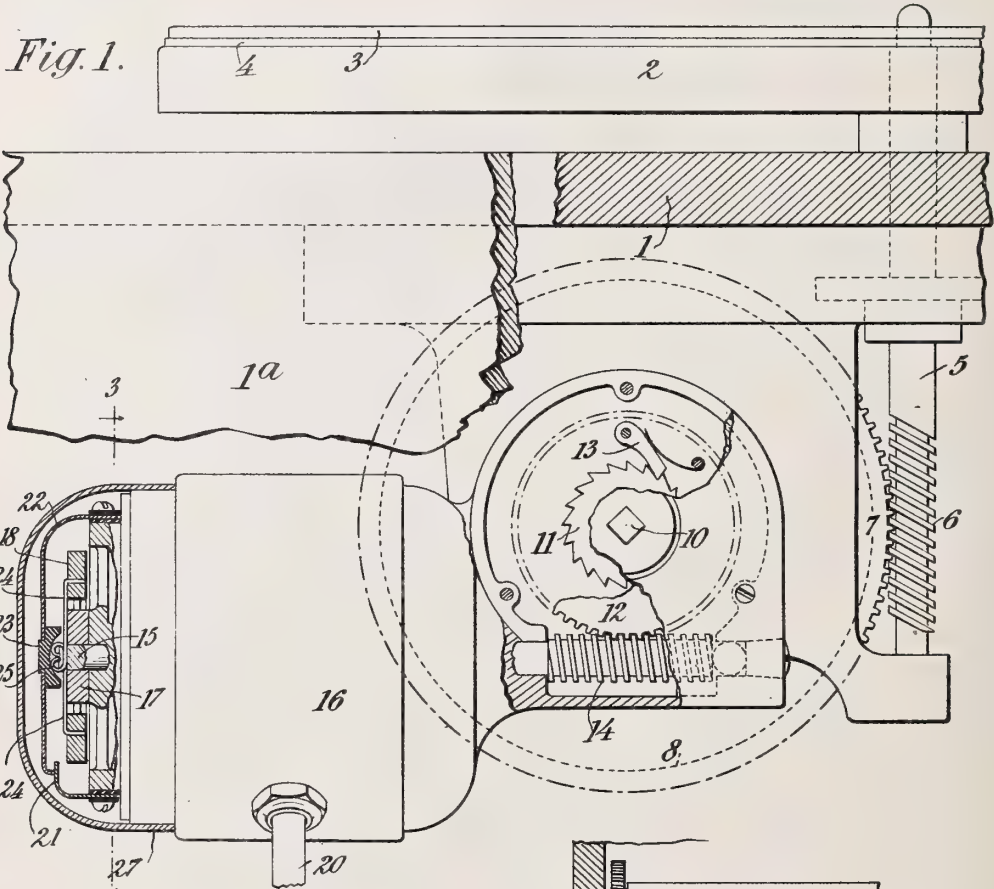
WINDER FOR SPRING MOTORS,
#1,205,572-----W.G.Shelton,
Patented-November 21, 1916.
Filed June 27th, 1916.

W. G. SHELTON.
WINDER FOR SPRING MOTORS.
APPLICATION FILED JUNE 27, 1916.

1,205,572.

Patented Nov. 21, 1916.

2 SHEETS—SHEET 1.



WITNESSES:
Rene P. P. P.
J. J. Wallace

INVENTOR :
William Gentry Shelton
By Attorneys,
Fraser, Treadwell & Myers

W. G. SHELTON.
WINDER FOR SPRING MOTORS.
APPLICATION FILED JUNE 27, 1916.

1,205,572.

Patented Nov. 21, 1916.
2 SHEETS—SHEET 2.

Fig. 3.

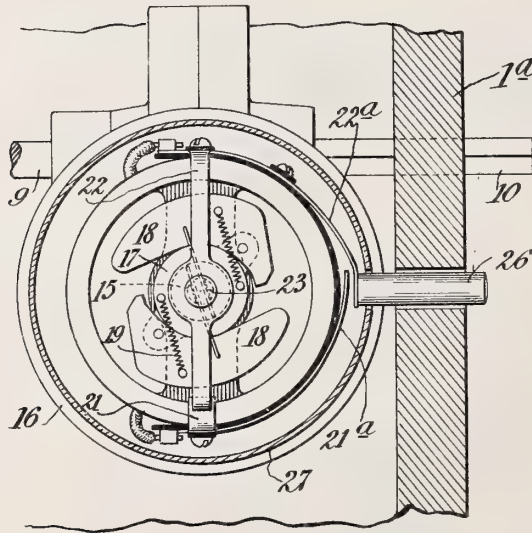
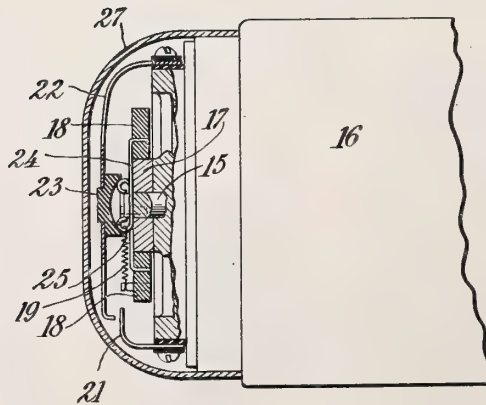


Fig. 4.



WITNESSES:
Rene' Guine
J. F. Wallace

INVENTOR :
William Gentry Shelton
By Attorneys,
Fraser, Park & Myers

UNITED STATES PATENT OFFICE.

WILLIAM GENTRY SHELTON, OF NEW YORK, N. Y.

WINDER FOR SPRING-MOTORS.

1,205,572.

Specification of Letters Patent.

Patented Nov. 21, 1916.

Application filed June 27, 1916. Serial No. 106,221.

To all whom it may concern:

Be it known that I, WILLIAM GENTRY SHELTON, a citizen of the United States of America, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Winders for Spring-Motors, of which the following is a specification.

This invention relates to mechanism for winding spring motors, it being so constructed and adapted that upon being set in motion it will continue its operation until the spring is wound to a predetermined condition of tension, whereupon the motor is stalled and immediately upon stalling breaks its electric circuit, which circuit remains broken until again intentionally closed by some suitable means, preferably by the actuation of the operator or attendant.

In the drawings accompanying this specification, one practicable embodiment of the mechanism is illustrated in connection with the spring motor of a talking machine, in which drawings,—

Figure 1 represents the winding motor in side elevation and the spring motor in end elevation, together with various associated parts of a talking machine, some of which being broken away. Fig. 2 is an end elevation of the winding motor. Fig. 3 is a section taken on a plane at about the line 3—3 of Fig. 1; and Fig. 4 is a view at about right angles to the plane of Fig. 3, showing parts of the switch in the position they assume when the motor is stalled. In Fig. 1 these parts are shown in the closed circuit and running position.

The table 1 of a talking machine is illustrated. This table really is the top of a box, the side of the box being illustrated at 1^a. There is mounted above the table a rotary platen 2 carrying a record disk 3, there being interposed between the platen and the disk a suitable layer 4, as for instance felt. The platen is driven by a shaft 5 having a worm 6 meshing with a worm wheel 7 carried by the spring barrel 8 of the spring motor. The spring motor is connected with a shaft 9 in a well-known manner and has one end 10 which projects through the casing, and is preferably provided with a square end for receiving the winding crank which may readily be applied and removed when desired.

The necessity of winding various spring-operated mechanisms by hand, as for instance talking machines, is quite annoying and, in fact, undesirable at times. In cases where it is desired to waste as little time as possible between the changing of record disks, it is also of advantage to be able to wind the spring motor by power during the time the attendant is removing one disk and replacing another. It is, in connection with such winding mechanism, of the greatest importance that the operator shall be assured of two things; first, that the power driven winder will upon bringing the spring to the proper tension, instantly stop working, and second, that it will not commence working until it is desired that it shall commence its operation. If the winder commences its operation automatically and without reference to the action of the repeating portions of the talking machine, it frequently happens that the winding will spontaneously or automatically commence at a portion of the reproduction where even the slightest noise of the mechanism becomes very undesirable. At other times it may be more desirable to have the mechanism wound during the reproduction period, as for instance if it is more desirable when the talking machine is being used to play dance music, that there shall be no interruption. In this instance, one acquainted with the music being played can start the winding at those portions of the music where the slight noise of the winder will not be materially noticed.

As a means of connection between the spring motor shaft 9 and the winding motor, there is shown a ratchet wheel 11 fast with the said shaft. This ratchet wheel preferably has a squared opening removably engaged on the squared end 10 of such shaft. A worm wheel 12 is shown mounted concentrically with the said shaft and ratchet wheel, but normally free from these when running in one direction and coupled thereto by means of a pawl 13 when running in the opposite direction, that is, the pawl and ratchet are so constructed that the winding motor is operative for driving the worm wheel 12 forward by means of the worm 14 on the motor shaft 15. The pawl engages the ratchet and is effective for rotating the shaft 9 in the winding direction. When, however, such shaft is rotated in the wind-

ing direction by means of the hand crank, the ratchet wheel 11 slips idly past the pawl 13.

The most efficient manner of assuring the 5 stoppage of the motor winding operation is to so proportion the power of the motor, the motor being represented in the present illustration by the reference character 16, and the power of the spring to be wound; that 10 when the spring is wound to the proper tension the motor will be stalled. Upon stalling an electric motor it is then desirable that the circuit be broken and electrical energy cut off from the winding of the motor. To this end I have embodied in my 15 improved winding motor a form of the automatic switch described in my co-pending application, Ser. No. 84,869, filed March 17, 1916, the switch being so organized that 20 upon the stalling of the motor the circuit is immediately broken.

The present form of automatic switch, while embodying the basic principles set forth in my above referred to application, 25 nevertheless contains some particular features rendering it peculiarly adapted to the present installation.

In the illustration, the motor shaft 15 is shown provided at its end with a hub 17 to 30 which are pivotally mounted a pair of weights 18 adapted to act after the analogy of governor weights. Each of these weights is drawn inwardly toward the shaft by means of an extension spring 19, and upon 35 rotation of the shaft is moved outwardly against the action of such spring. The current is shown led into the motor from some suitable source by means of a cable 20. The circuit breaker herein illustrated comprises 40 a contact member 21 and a spring contact member 22. These two members are, by virtue of the resiliency of such member 22, normally in contact for closing the circuit. The spring member 22 is shown carrying a 45 saucer-shaped engaging button 23 having the center of its concave surface located in alinement with the center of the shaft 15. Each weight 18 is shown pivotally carrying an actuator 24, such actuator being illus- 50 trated in the form of a wire having a bent over end entering a hole in the weight and having its free end crossing the motor shaft when the weights are in idle position, such free end being provided with a loop 25, such 55 actuators and loops being so proportioned relatively to the parts that when the weights are thrown out, due to the centrifugal action of the motor shaft, the loops substantially coincide as illustrated in Fig. 1, and are 60 located within the deepest portion of the saucer 23, whereby the spring contact 22 is permitted to act and come into engagement with its coöperative contact 21. When, however, the motor shaft is at rest and the

weights 18 are drawn inwardly responsive 65 to their springs, the actuator and loops 25 are pressed across the shaft in opposite directions and engage the sloping sides of the saucer 23 and raise the member 22 against the action of its spring, thereby separating 70 the members 21 and 22 and interrupting the circuit. The members 21 and 22 are shown formed of sheet metal and respectively provided with transverse straps 21^a and 22^a to form a circuit closer controlled by a button 75 26. This button is shown extending through the side 1^a of the machine casing and is preferably located on the same side as that through which the crank-engaging end of the shaft 9 extends. The push button 26 is 80 shown held in position adjacent the normally separated ends of the straps 21^a and 22^a by means of a hole in a removable cap 27 forming a part of the motor casing.

The operation of the device is substan- 85 tially as follows: When it is desired to wind the spring motor by means of the power driven motor, the crank handle is preferably removed from the spring motor shaft 9. The operator then, whenever occasion may 90 arise for rewinding the spring motor merely presses the push button 26 which establishes the motor circuit through the contacts 21^a and 22^a and immediately starts the operation of the motor. Upon the motor shaft 95 assuming the necessary momentum to throw the governor weights 18 outwardly, the moving of the loops 25 into the deepest part of the saucer 23 permits the circuit to be established between the contacts 21 and 22. 100 The finger may then be removed from the push button whereupon the circuit is maintained closed through the spring action of the member 22. The motor shaft 15 rotates the worm wheel 12 by means of the worm 105 14, and through the dog or pawl 13 carried by such wheel rotates the spring motor shaft 9 and winds the spring of the spring motor. Upon the spring being wound up either to the limit to which it can be wound or to 110 the limit of the power of the motor, the motor thereupon becomes stalled. The term stalled when herein applied to the motor is intended to refer to either the complete stoppage of the rotary element of the 115 motor or the very material reduction of the speed of such element. Immediately upon the stalling of the motor the weights 18 are drawn inwardly to their idle position and the actuators 24 caused to act upon the shallow part of the saucer 23 and raise the contact 22 from the contact 21, whereupon the circuit is cut off from the motor and is not again reestablished until this is done by intention or desire. 120 125

It is to be understood that the mechanism herein shown and described is an illustrative example of the invention and that

changes may be made within the scope of the claims without departing from the spirit of the invention.

What I claim is:—

5 1. In a winder for spring motors, the combination with means for attachment to the winding element of a spring motor, of an electric motor for driving said attachment means, and an automatic switch in the
10 motor circuit adapted to break such circuit when the motor is stalled.

2. In a winder for spring motors, the combination with a driving part adapted for attachment to the arbor of a spring motor,
15 of an electric motor for operating the same, the driving force of said motor being so proportioned that the motor will be stalled upon the completion of a predetermined amount of spring winding, and an automatic
20 switch associated with said motor and adapted for breaking the circuit thereof upon the motor being stalled.

3. The combination with a part adapted for attachment to the shaft of a spring motor, of means for electrically driving such
25 part, a switch controlling the circuit thereof, and an automatic switch for opening the circuit upon the stoppage of such part.

4. The combination with a part adapted
30 to be connected to the shaft of a spring motor, of an electric motor for driving the same, said motor having a spindle, a pair of weights pivoted to the said spindle and movable in a plane radially to the axis of rotation thereof, a circuit closer comprising a
35 resilient contact member normally adapted to move to its circuit closing position, a saucer-shaped device carried by said resilient member, actuators carried by said
40 weights and comprising bars having members adapted to lie under the deepest part of the said saucer-shaped member when the weights are moved outwardly incident to centrifugal force and adapted to engage the
45 shallower portions of said saucer-shaped

member and move said resilient contact member into its circuit breaking position upon the inward movement of the said weights.

5. In a device of the character described, 50 the combination with a spring motor, of an electric motor adapted to wind the same and so proportioned in strength to the strength of the spring that the electric motor becomes stalled upon a predetermined amount of 55 winding of the spring, and an automatic switch for breaking the circuit of such electric motor upon the same being stalled.

6. In a device of the character described, the combination with a spring motor, of an 60 electric motor adapted to wind the same and so proportioned in strength to the strength of the spring that the electric motor becomes stalled upon a predetermined amount of winding of the spring, an automatic switch 65 for breaking the circuit of such electric motor upon the same being stalled, and manually operated means for closing the circuit of said motor.

7. In a device of the character described, 70 the combination with a spring motor provided with a winding shaft, of a removable crank carried by said shaft, an electric motor comprising a part connected to said shaft by pawl and ratchet mechanism, 75 whereby the said shaft may be rotated independently of said electric motor, said electric motor being adapted to stall upon winding the spring to a predetermined tension, manually operated means for closing the cir- 80 cuit of the said electric motor, and an automatic switch for breaking the said circuit upon the stalling of the electric motor.

In witness whereof, I have hereunto signed my name in the presence of two sub- 85 scribing witnesses.

WILLIAM GENTRY SHELTON.

Witnesses:

CHAS. LYON RUSSELL,
THOMAS F. WALLACE.

TONE ARM MOUNTING FOR TALKING
MACHINES,

#1,205,627-----F.C.Hinckley & L.G.Larsen,
Patented-Nov. 21st, 1916.
Filed-July 31st, 1915.

F. C. HINCKLEY & L. G. LARSEN.
TONE ARM MOUNTING FOR TALKING MACHINES.
APPLICATION FILED JULY 31, 1915.

1,205,627.

Patented Nov. 21, 1916.

Fig. 1.

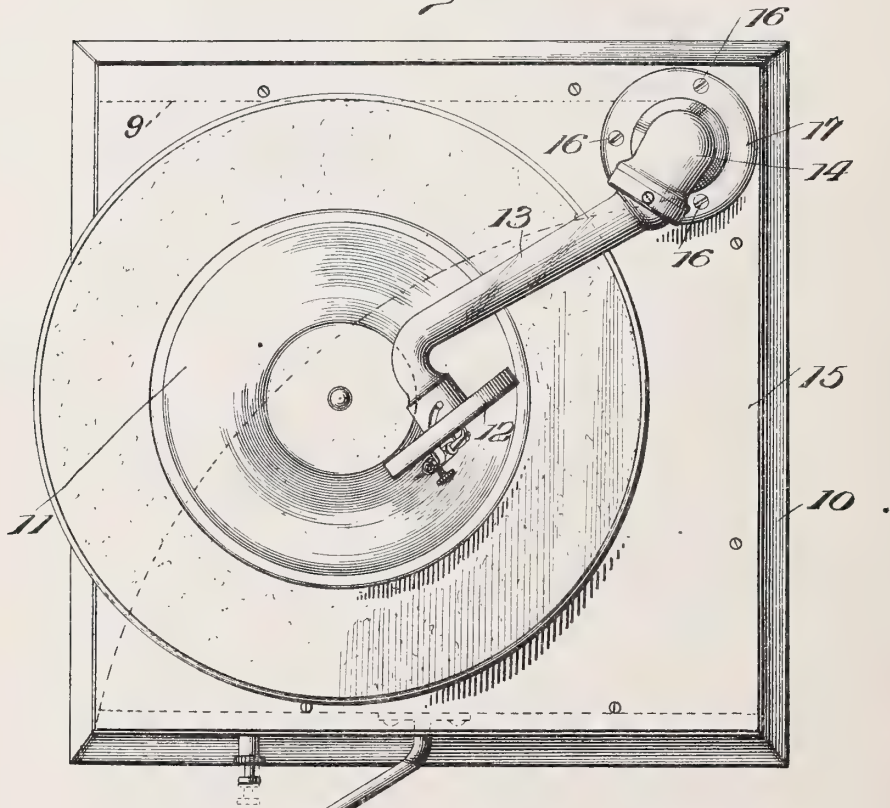


Fig. 2.

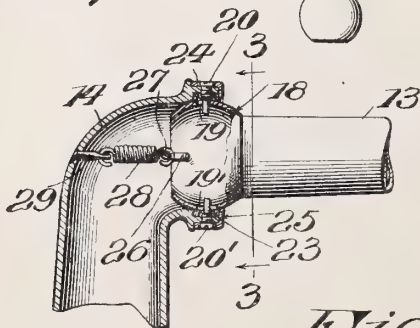


Fig. 3.

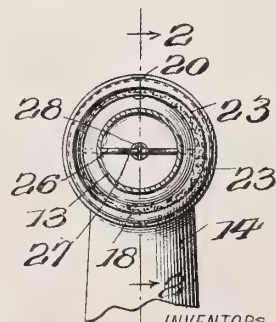
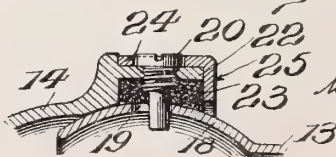


Fig. 4.



INVENTORS
Frank C. Hinckley and
Louis G. Larsen.
BY
Lawrence Cameron, Lewis & Massie
ATTORNEYS

UNITED STATES PATENT OFFICE.

FRANK C. HINCKLEY AND LOUIS G. LARSEN, OF BRIDGEPORT, CONNECTICUT, ASSIGNORS TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

TONE-ARM MOUNTING FOR TALKING-MACHINES.

1,205,627.

Specification of Letters Patent.

Patented Nov. 21, 1916.

Application filed July 31, 1915. Serial No. 43,009.

To all whom it may concern:

Be it known that we, FRANK C. HINCKLEY and LOUIS G. LARSEN, citizens of the United States of America, and residents of Bridgeport, Connecticut, have invented a new and useful Improvement in Tone-Arm Mountings for Talking-Machines, which invention is fully set forth in the following specification.

The present invention is an improvement in talking-machines, and particularly is an improved tone-arm mounting; and the objects of the invention are to provide a simple, durable, economical and readily assembled mounting, the connection between the tone-arm and its support being close and practically sound-tight.

The invention is particularly adapted for use in connection with a small-sized talking-machine for use with little disk sound-records of the "Little wonder" type.

The invention will be better understood by reference to the accompanying drawing, illustrating one expression of the inventive idea, and wherein—

Figure 1 is a plan view of a talking-machine equipped with the invention; Fig. 2 is a vertical section, partly in elevation, showing the tone-arm mounting, the section being on the line 2—2 of Fig. 3; Fig. 3 is a transverse vertical section on the line 3—3 of Fig. 2; and Fig. 4 is an enlarged detail.

Referring to the drawings, wherein like reference numerals indicate like parts, 10 is a talking-machine casing on which is rotatably mounted in any suitable manner a sound-record 11, here shown as being of the disk type. A sound-box 12 mounted on one end of a tone-arm 13 is adapted to be propelled across the record in the usual manner. The other end of the tone-arm 13 projects into a support, here shown as a stationary hollow member 14 which is secured to the top 15 of the talking-machine casing 10 in any suitable manner, as by screws 16 passing through a flange 17. The lower end of the member 14 connects with an amplifier 9 in the casing 10.

The end of the tone-arm that projects into the hollow member 14 is bulged or made spherical in form, as clearly indicated at 18 in Fig. 2, and this curved portion has a pin-and-slot connection with its support. As

here shown, the spherical portion is provided at diametrically opposite points with slits or openings 19—19', in which openings project the inner ends of pins 20—20' which are carried by the upper end of the hollow member 14. As a preferred construction, the upper end of hollow member 14 is provided with an annular flange 22, preferably integral therewith, which flange carries the pins 20 and 20' in screw-threaded engagement therewith. It will be understood, however, that by the term "flange" any annular extension or projection is meant.

Interposed between flange 22 and the curved or spherical surface 18 is a washer 23 of felt, or other suitable material, this washer acting, among other things, to form a sound-tight joint between the tone-arm and its support. An annular member 24 is carried by flange 22 and is provided with an inwardly extending flange 25 which closely approaches the curved surface 18. Perforations or openings in said annular member 24 accommodate the heads of pins 20 and 20', which hold said member in place on the flange 22, as clearly shown in Fig. 4. The opening in the inwardly extending flange 25 is elliptical rather than circular in shape, its longer axis being horizontal, as shown in Fig. 3. This form of opening is provided to enable the tone-arm to have a sufficient lateral traverse.

A pin 26 is mounted in the bulged or spherical portion 18 of the tone-arm 13, and this pin is preferably provided with a curved part 27, to which part is secured one end of the spring 28, the other end of which is secured to the support or hollow member 14, as by a rivet 29. This spring maintains the tone-arm 13 continually under the desired tension, and under normal conditions, when the stylus is in engagement with the record, said spring holds the tone-arm with one of the pins 20 and 20' against the front end of the corresponding one of the slots or openings 19 and 19'. As shown the upper pin 20 engages the end of its slot, the pin 20' being normally intermediate the ends of its slot to permit the tone-arm to rise and fall to follow irregularities of the record.

While, for the purpose of illustration, one expression of the inventive idea is shown and described in detail, it is to be understood

that the invention is not limited to the structure shown, but that the inventive idea is susceptible of various mechanical expressions within the limits of the appended claims.

What is claimed is:—

1. In a talking machine, the combination of a casing, an amplifier, a hollow stationary elbow mounted on said casing and communicating at its lower end with said amplifier, a tone-arm provided with a bulged or spherical portion surrounded by the upper horizontal end of said elbow, and opposed vertical pivot pins carried by one of said last two members and engaging opposed slots in the other of said members.

2. In a talking machine, the combination of a casing, an amplifier, a hollow stationary elbow mounted on said casing and communicating at its lower end with said amplifier, a tone-arm provided with a bulged or spherical portion surrounded by the upper horizontal end of said elbow, and opposed vertical pivot pins carried by said upper end of said elbow and engaging in opposed slots in said spherical portion.

3. In a talking machine, the combination of a casing, an amplifier, a hollow stationary elbow mounted on said casing and communicating at its lower end with said amplifier, a tone-arm provided with a bulged or spherical portion surrounded by the upper horizontal end of said elbow, opposed vertical pivot pins carried by one of said last two members and engaging opposed slots in the other of said members, and a spring reacting between said spherical portion and said elbow.

4. In a talking-machine, the combination of a casing, an amplifier, a hollow stationary member mounted on said casing and communicating at its lower end with said amplifier, a tone-arm provided with a bulged or spherical portion surrounded by the upper end of said stationary member, a felt washer interposed between said upper end of said stationary member and said spherical portion, and opposed pivot pins carried by said upper end of said stationary member and engaging in opposed slots in said spherical portion.

5. In a talking machine, a hollow stationary member, a tone-arm provided with a bulged or spherical portion surrounded by one end of said stationary member, a felt washer interposed between said end of the stationary member and said spherical portion, and an annular member carried by said end of the stationary member and having an inwardly extending flange provided with an elliptical opening.

6. In a talking machine, a hollow stationary member, a tone-arm provided with a bulged or spherical portion surrounded by one end of said stationary member, a felt

washer interposed between said end of the stationary member and said spherical portion, pivot means operatively connecting said end of the stationary member and said tone-arm, and an annular member carried by said end of the stationary member and having an inwardly extending flange provided with an elliptical opening.

7. In a talking-machine, the combination of a casing, an amplifier, a hollow stationary member mounted on said casing and communicating at its lower end with said amplifier and provided with a flange at its upper end, a tone-arm provided with a bulged or spherical portion surrounded by said flange, a felt washer interposed between said flange and spherical portion, means limiting the vertical movement of said tone-arm, and an annular member carried by said flange and having an inwardly extending flange provided with an elliptical opening.

8. In a talking-machine, a tone-arm provided at one end with a spherical portion having opposed slots, a support for said tone-arm in which said spherical portion projects, a washer interposed between said support and spherical portion, and means projecting through said washer and engaging in said opposed slots, said last-named means limiting the vertical movement of the tone-arm.

9. In a talking-machine, a tone-arm provided at one end with a spherical portion having opposed slots, a support for said tone-arm in which said spherical portion projects, a washer interposed between said support and spherical portion, means projecting through said washer and engaging in said opposed slots, said last-named means limiting the vertical movement of the tone-arm, and a spring reacting between said spherical portion and said support.

10. In a talking-machine, a tone-arm provided with a spherical portion, a support in which said spherical portion projects, means for limiting the vertical movement of said tone-arm, and an annular member carried by said support and surrounding said spherical portion and provided with an elliptical opening, the longer axis of which is horizontal.

11. In a talking-machine, a tone-arm provided at one end with a spherical portion, a support for said tone-arm in which said spherical portion projects, a washer interposed between said spherical portion and support, and an annular member carried by said support and engaging the front edge of said washer, said annular member being provided with an elliptical opening the longer axis of which is horizontal.

12. In a talking-machine, the combination of a casing, an amplifier, a hollow stationary member mounted on said casing and commu-

nicating at its lower end with said amplifier, a tone-arm provided with a bulged or spherical portion extending within said hollow member, a felt washer interposed between said hollow member and spherical portion, and an annular member carried by said hollow member and having an inwardly extending flange provided with an elliptical opening.

10 13. In a talking machine, a hollow support having a horizontal open end, a tone-arm having a spherical portion projecting within the said open end of said support, one of said members having opposed slots, 15 vertical pivot means carried by the other of said members and engaging in said slots, and a spring reacting between said spherical portion and said support.

14. In a talking machine, a hollow support having a horizontal open end, a tone- 20 arm having a spherical portion projecting within the said open end of said support, said spherical portion having opposed slots, opposed vertical pivot pins carried by said support and engaging in said slots, and a 25 spring reacting between said spherical portion and said support.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

FRANK C. HINCKLEY.
LOUIS G. LARSEN.

Witnesses:

JOHN GRAHAM, Jr.,
C. W. AKELAW.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DRIVING APPARATUS FOR
PHONOGRAPHS,

#1,205,631-----A.A.Horton,

Patented-Nov.31st,1916.

Filed-Oct.23rd,1915.

A. A. HORTON.
 DRIVING APPARATUS FOR PHONOGRAPHS.
 APPLICATION FILED OCT. 23, 1915.

1,205,631.

Patented Nov. 21, 1916.

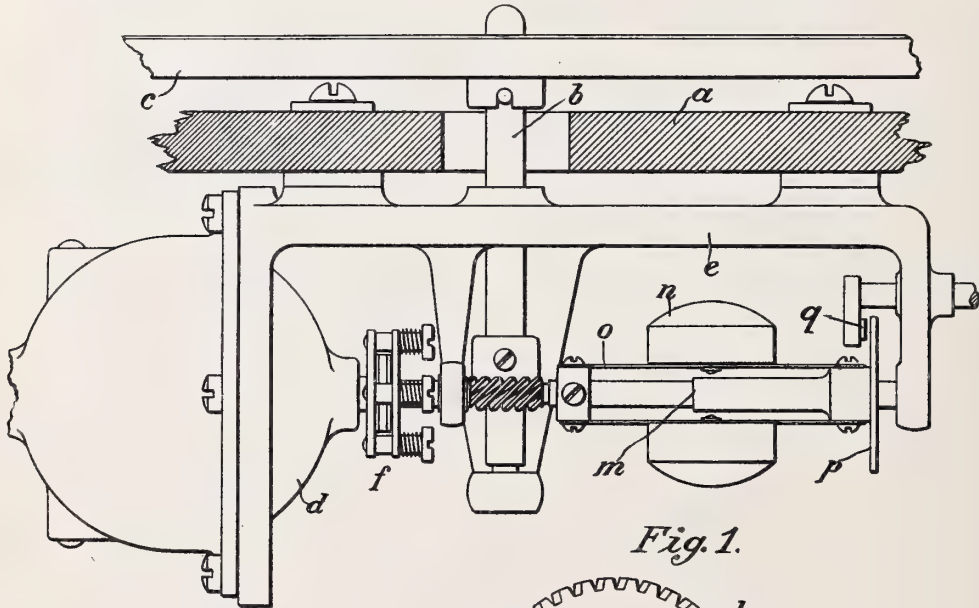


Fig. 1.

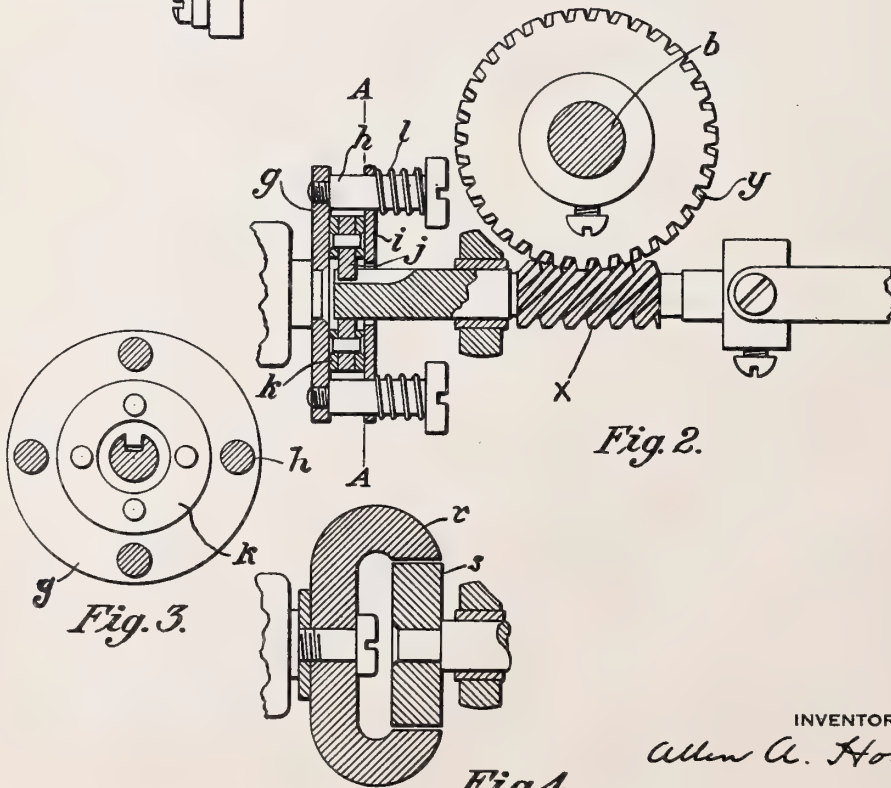


Fig. 2.

Fig. 3.

Fig. 4.

INVENTOR
 Allen A. Horton
 by Raymond A. Parker
 ATTORNEYS

UNITED STATES PATENT OFFICE.

ALLEN A. HORTON, OF DETROIT, MICHIGAN.

DRIVING APPARATUS FOR PHONOGRAPHS.

1,205,631.

Specification of Letters Patent. . . . Patented Nov. 21, 1916.

Application filed October 23, 1915. Serial No. 57,426.

To all whom it may concern:

Be it known that I, ALLEN A. HORTON, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Driving Apparatus for Phonographs, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings; which form a part of this specification.

This invention relates to driving apparatus for maintaining a constant predetermined speed, and is especially adapted for driving phonograph records.

In the drawings, Figure 1 is a side elevation of the apparatus showing it attached to a phonograph stand. Fig. 2 is a horizontal cross section through the clutch, drive shaft and the drive connections between the drive shaft and the phonograph spindle. Fig. 3 is a cross section on the line A—A of Fig. 2. Fig. 4 is a longitudinal section of a form of clutch, of the magnetic type.

The phonograph housing or box is lettered *a*, the driving spindle *b*, the revolving table *c*.

e designates a suspended frame which carries the motor and drive connections.

d represents the motor.

x designates a worm on the driven shaft and *y* a helical gear on the driving spindle *b*. *f* designates the disk clutch shown in detail in Fig. 2 and comprising a disk *g* fast to the driving member and provided with a plurality of pins *h* upon which slides the movable disk *i*. Upon the driven shaft is splined a disk *j* which is provided on either side with friction rings *k* preferably made out of leather or other substances having a large coefficient of friction.

It will be noted that the movable disk *i* of the driving member is yieldingly forced against the movable disk *j* of the driven member by reason of the coiled springs *l* which engage around the pins *h*. The consequence of this clutch arrangement is that these springs are always tending to press the movable disk *i* against the movable disk *j* and consequently the movable disk *j* is yieldingly pinched between the driving disks *g* and *i*. This, therefore, forms a multiple

disk clutch with a limited number of disks so it may easily slip when subjected to sudden changes of load due to acceleration.

Now, the sudden changes of load due to acceleration is accomplished by the use of a governor shown in Fig. 1. An extension of the driven shaft is divided into two parts which are telescoped as indicated at *m*. These telescoped shaft parts may slide easily on each other and this sliding is accomplished by the throwing out of the weights *n* which are attached by thin leaf springs *o* to the two shaft parts. It will, therefore, be easily understood that when the machine accelerates beyond a given speed the weights throw out and the right hand shaft part is drawn toward the left hand shaft part, bringing the friction disk *p* in contact with the friction point *q*. With the customary construction heretofore in use, the only speed reducing means has been this friction between the friction disk and the friction point.

I am also aware that it has been proposed to utilize the governor to operate one of the clutch parts and eliminate this load producing friction device. However, the load producing device alone is objectionable for the reason that it throws all the increased load upon the motor, thereby attempting to make the speed constant by retarding the motor itself. The single clutch operated by the governor is objectionable for the reason that the operation of the governor must needs produce a sudden reduction of speed by drawing the clutch parts away from each other.

My clutch parts are never drawn away from each other but are so stressed by the springs that when subjected to an unusual load, they slip, that is to say, when the friction disk is drawn into engagement with the friction point by the operation of the governor, the load is thereby increased. The clutch parts will now slip and the motor itself can run at the increased speed due to current changes, but the shaft itself will be driven at a constant speed due to the slip-page of the clutch parts.

In Fig. 4 I have shown a magnetic form of clutch in which *r* is the permanent magnet and *s* is an armature which will ordinarily rotate with the permanent magnet except when subjected to increased load due

to the contact of the friction disk p with the friction point q .

What I claim is:

1. In driving apparatus for phonographs, 5 the combination of a drive shaft, a driven shaft, load producing apparatus connecting with the latter for increasing the load when the shaft accelerates beyond a given speed, and a spring actuated clutch interposed be- 10 tween the drive shaft and the driven shaft, the clutch parts being so stressed as to maintain a uniform speed for the driven shaft although the drive shaft speeds up, such uniform speed being accomplished by the 15 clutch parts slipping due to increased load due to the load producing apparatus.

2. In driving apparatus for phonographs, the combination of a drive shaft, a driven shaft, load producing apparatus connecting 20 with the latter for increasing the load when the driven shaft is accelerated above a given speed, and a clutch interposed between the drive shaft and the driven shaft and comprising a plurality of disks yieldingly 25 pressed against each other by a force calculated to allow a certain amount of slippage of the disks when the drive shaft accelerates above a given speed to secure uniformity of speed of the driven shaft.

3. In phonograph driving apparatus, the 30 combination of a drive shaft, a driven shaft, the latter of which is divided into two parts

which telescope, a friction disk on the movable telescoping part, a governor for controlling the sliding of the telescoping parts, 35 a friction point against which the friction disk may be brought, and a clutch interposed between the drive shaft and the driven shaft and calculated to slip to a certain extent when the governor throws the 40 friction disk and friction point together to increase the load on the driven shaft, such slippage being calculated to secure uniform speed for the driven shaft.

4. In driving apparatus for phonographs, 45 the combination of a drive shaft, a driven shaft, load producing apparatus connected directly with the driven shaft for varying the load upon the driven shaft in accordance with the speed thereof, and a clutch 50 connection between the drive shaft and the driven shaft, the said clutch parts being maintained in such frictional engagement as to avoid the transmission of sudden changes of speed from the driven shaft to the drive 55 shaft and also to maintain uniformity of speed of the driven shaft by reason of a certain amount of slippage at the clutch when the load producing apparatus increases the load when there is a tendency to 60 accelerate.

In testimony whereof I sign this specification.

ALLEN A. HORTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."

TONE CONTROLLER,
#1,305,915-----A. Mayer,
Patented-Nov. 21st, 1916.
FiledOApril 4th, 1916.

A. MAYER.
TONE CONTROLLER.
APPLICATION FILED APR. 4, 1916.

1,205,915.

Patented Nov. 21, 1916.

FIG. 1.

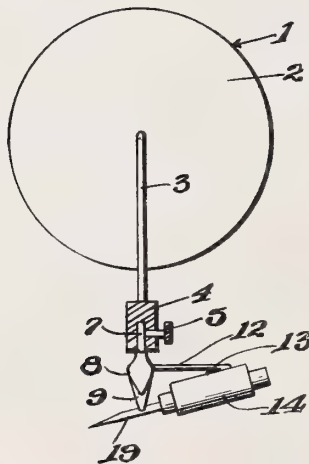


FIG. 2.

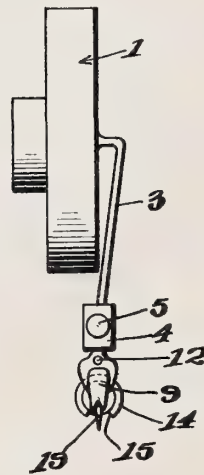


FIG. 3.

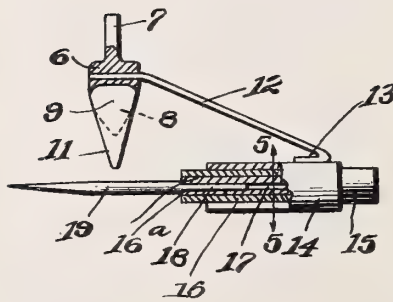


FIG. 4.

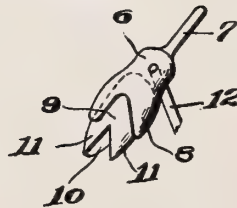


FIG. 5.



Witnesses
H. F. Keith.
H. H. Martin

By

A. B. Randolph Jr.

Inventor
A. MAYER.

Attorney

UNITED STATES PATENT OFFICE.

AUGUSTINE MAYER, OF TIFFIN, OHIO.

TONE-CONTROLLER.

1,205,915.

Specification of Letters Patent.

Patented Nov. 21, 1916.

Application filed April 4, 1916. Serial No. 88,818.

To all whom it may concern:

Be it known that I, AUGUSTINE MAYER, a citizen of the United States, residing at Tiffin, in the county of Seneca and State of Ohio, have invented certain new and useful Improvements in Tone-Controllers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to new and useful improvements in tone controllers and the principal object of the invention is to provide a device for the controlling of the tones reproduced by talking machines of the usual construction.

Another object of the invention is to provide a tone controller which is interposed between the sound record and the reproducing diaphragm, to eliminate the reproducing of undesirable metallic sounds which frequently accompany the use of the ordinary type of reproducer when used without this attachment.

A further object of the invention is to provide a device by which the levers on the diaphragm may be adjusted to meet various conditions and also to control and modify the tone and volume.

With these and other objects in view, the invention consists in the novel combination and arrangement of parts which will be fully set forth in the following specification and accompanying drawings, in which:—

Figure 1 is a side view in elevation of the reproducer showing this improved device attached thereto. Fig. 2 is an end view of Fig. 1. Fig. 3 is an enlarged detail view partly in section of the attachment. Fig. 4 is a detail perspective view of the holder which is carried by the needle socket of the reproducer and supports the device, and Fig. 5 is a transverse sectional view on the line 5—5 of Fig. 3.

Referring to the drawings, 1 designates a reproducer of the ordinary construction provided with the usual diaphragm 2. Extending downwardly from the central portion of the diaphragm is the usual stylus arm 3 carrying at its lower end, the needle socket 4. This needle socket is provided with the usual set screw 5 and the set screw engages the attachment to hold the same in place as clearly illustrated in Fig. 1.

The connector for the attachment consists of the main body 6 having a stem 7 formed integral therewith which extends upwardly and is adapted to seat in the needle socket 4 as clearly shown in Fig. 1 to support the device in operative position. Formed at the end of the body opposite the stem 7 is a pair of downwardly extending clamp arms 8 for holding the fiber needle engaging block which will be more fully hereinafter described.

The needle engaging block above referred to consists of a body 9 formed of fiber or any other suitable material formed with an inverted V-shaped slot 10 to provide a pair of arms 11. The slot 10 is adapted to receive the needle and the body 9 is inserted between the clamp arms 8 of the connector so as to be firmly held in place, as clearly shown in the drawings. Extending through the body 6 and secured therein is the supporting arm 12 for the stylus or needle holder and this arm consists of a spring wire and extends downwardly as illustrated in Fig. 3 and is provided with the return bend 13 which is soldered or otherwise secured to the clamping sleeve 14 which is provided on one side with a suitable slot 15 to form a pair of clamp arms in which the needle holder is mounted.

The needle or stylus holder above referred to consists of an outer shell or sleeve 16 having the rubber or cushioned tube 16^a secured therein which tube may be formed of any suitable material but is preferably of rubber as above mentioned. The tube 16^a is closed at one end by a suitable plug 17 of any suitable material so as to form at its opposite end the needle socket 18 in which the needle or stylus 19 is frictionally held. It will thus be seen that the needle will be cushioned from the shell 13 and the clamp 14.

It will be apparent from the foregoing that in use, the connector is placed in the needle or stylus socket 4 of the reproducer as shown in Figs. 1 and 2 and the weight of the reproducer will cause the needle or stylus maintained within the needle holder to move upwardly into the V-shaped slot 10, thus causing the fiber 9 to straddle the needle or stylus and as the stylus travels through the groove of the record, it will be seen that the tone wave will cause the needle to oscillate the stylus arm in an indirect manner thereby modifying the tone.

In order that the tone may be adjusted, the sleeve 15 may be slid into or farther out of the socket so as to adjust the levers of the stylus on the fiber.

5 While in the foregoing there has been shown and described the preferred embodiment of this invention, it is to be understood that such changes may be made in the combination and arrangement of parts as will
10 fall within the spirit and scope of the appended claims.

What is claimed is:—

1. The combination of a reproducer having a stylus arm and a needle socket at the
15 lower end of the stylus arm, of a tone modifier adapted for connection to the socket comprising a connector having a cushioning element and a stylus holder arranged in angular relation so that when the stylus
20 rests on a record it will engage the cushioning element and thus modify the tone.

2. In combination with a reproducer having a stylus arm and a needle socket at the lower end of the stylus arm, a connector
25 adapted to be inserted in the needle socket, a stylus holder carried by the connector, a stylus in the stylus holder and means carried by the connector to engage the stylus to transmit the sound waves of a record
30 through the stylus and connector to the stylus arm and reproducer.

3. The combination with a reproducer having a stylus arm and a needle socket at the lower end of the stylus arm, of a connector adapted to be secured to the needle
35 socket, a cushioning element at the lower end of the connector, a resilient arm carried by the connector, a stylus holder carried by the arm in angular relation to the connector, and a stylus in the stylus holder adapted to
40 rest on a sound record and support the connector and reproducers.

4. A tone modifier comprising a connector adapted to be attached to a reproducer, a
45 resilient arm carried by the connector, a

stylus holder carried by the resilient arm, the connector being provided with a socket, a cushioning member in said socket having an inverted V-shaped slot in its lower end and a stylus in the stylus holder adapted
50 to engage in the V-shaped slot of the cushioning member.

5. A tone modifier comprising a connector, a fiber block carried by the connector, said fiber block being provided with
55 an inverted V-shaped slot, a resilient arm carried by the connector, a split sleeve at the free end of the arm, a cushioned needle holder adjustable in the split sleeve and a stylus carried by the needle holder and
60 adapted to engage in the inverted V-shaped slot in the fiber block, whereby the sound will be transmitted from a sound record to the stylus and to the connector.

6. A tone modifier comprising a connector having a stem at one end, said stem
65 being adapted for entrance into the needle socket of a reproducer, a fiber block at the opposite end of the connector, said fiber block being provided with an inverted
70 V-shaped slot, a spring arm carried by the connector, a split sleeve at the free end of the spring arm, a sleeve slidable through the split sleeve, a rubber tube within the last mentioned sleeve, a plug in one end of the
75 tube, and a stylus in the opposite end of the tube and projecting beyond the same, said stylus being adapted to engage in the inverted V-shaped slot of the fiber block, so that the sound waves transmitted to the stylus
80 from a sound record will be transmitted to the reproducer through the fiber block and stem.

In testimony whereof I affix my signature in presence of two witnesses.

AUGUSTINE MAYER.

Witnesses:

LOUIS MESSER,
ADELBERT R. KELLER.

(REPEATER DEVICE)

PHONOGRAPH,
#1,206,013-----D.M.Manson,
Patented-November 28th, 1916.
Filed-January 24th, 1916.

D. M. MANSON.
 PHONOGRAPH.
 APPLICATION FILED JAN. 24, 1916.

1,206,013.

Patented Nov. 28, 1916.

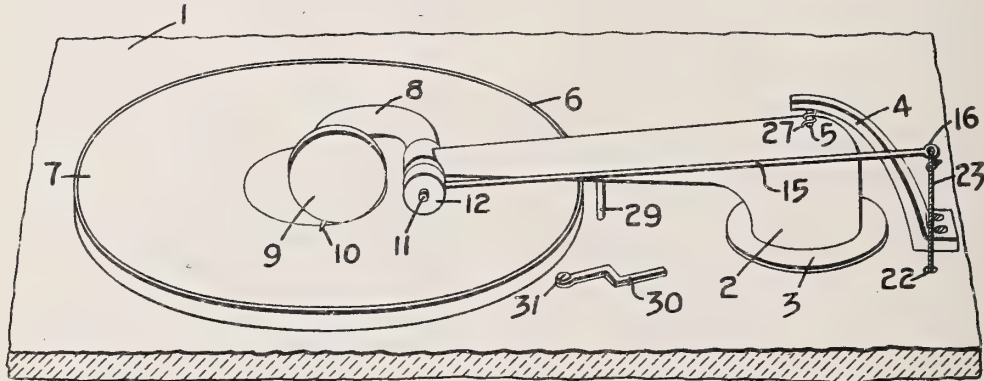


FIG. 1

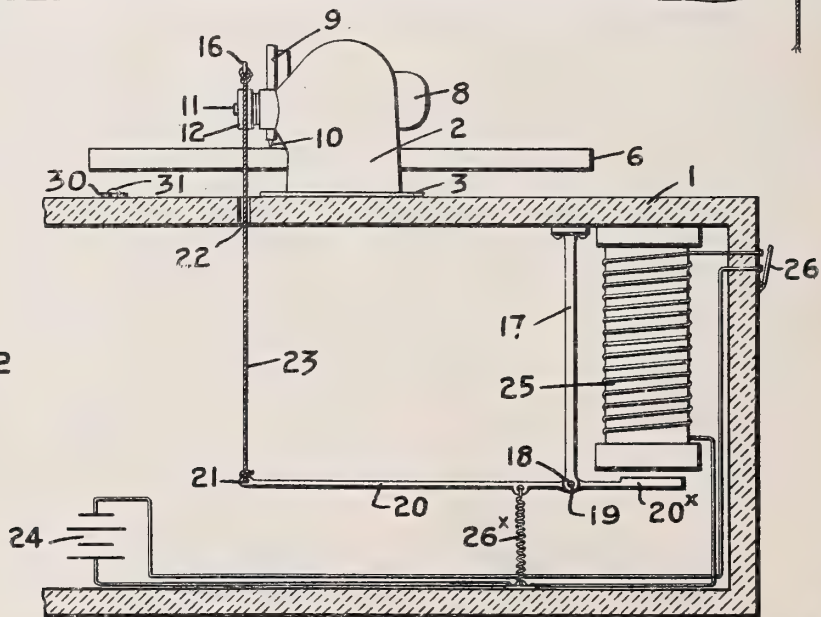


FIG. 2

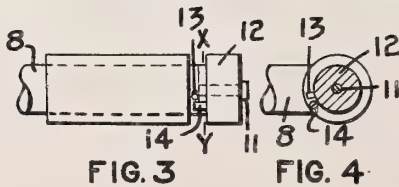


FIG. 3

FIG. 4

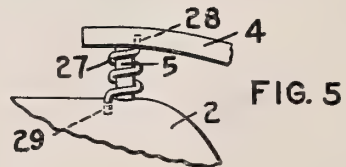


FIG. 5

WITNESSES

G. E. Deloar.
Herbude Nicholson.

INVENTOR

Donald Milne Manson.

By *Letherstonkaugh & Co.* ATTYS.

UNITED STATES PATENT OFFICE.

DONALD MILNE MANSON, OF HAMILTON, ONTARIO, CANADA.

PHONOGRAPH.

1,206,013.

Specification of Letters Patent.

Patented Nov. 28, 1916.

Application filed January 24, 1916. Serial No. 73,992.

To all whom it may concern:

Be it known that I, DONALD MILNE MANSON, of the city of Hamilton, in the county of Wentworth, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Phonographs, of which the following is the specification.

My invention relates to improvements in phonographs and the object of the invention is to devise electrical means whereby after a record has been played, the needle may be carried back to the beginning so that the playing of the record may be repeated, and it consists essentially of an arm secured at one end to the sound box crook, magnetic means for drawing down the opposite end of the arm thereby raising the sound box and needle from the record, a circuit for the magnet and a switch for making and breaking the circuit, a downwardly projecting portion carried by the taper tube, an adjustable stop designed to be turned in position to correspond with the starting point of the record, and a spring connected to the taper tube and to the bracket thereof and adapted to turn the taper tube from the center of the record when the needle is out of contact with the record to the starting position, whereby the taper tube is stopped from further turning by the projection thereof engaging with the adjustable stop, the parts being arranged as hereinafter more particularly explained in the following specification.

Figure 1 is a perspective view of a fragmental portion of the top of a phonograph showing a portion of my repeating means. Fig. 2 is a section through the rear portion of a phonograph box showing my repeating means. Fig. 3 is an enlarged detail of the junction of the sound box crook and the taper tube showing my attachment thereto. Fig. 4 is a section through Fig. 3 along the line $x-y$. Fig. 5 is an enlarged detail elevation of my spring attachment for turning the taper tube from the central portion of the record to the outer edge.

In the drawings like numerals of reference indicate corresponding parts in each figure.

1 indicates the usual casing of a phonograph.

2 indicates the taper tube or arm turnably mounted in the usual way in the collar 3.

4 indicates the usual bracket secured to the casing 1 and supporting the pivot 5 in the taper tube 2 in the usual way.

6 indicates the turntable of the phonograph carrying the record 7.

8 indicates the sound box crook turnably mounted in the ordinary fashion at the extending end of the taper tube 2.

9 indicates the sound box carried by the crook 8.

10 indicates the needle carried by the sound box 9.

11 indicates a pivot secured to the crook 8.

12 indicates a drum turnably mounted on the pivot 11.

13 indicates a projection carried by the crook 8.

14 indicates a projection carried by the drum 12 and adapted to engage with the projection 13.

15 indicates an arm secured at one end to the drum 12 and at its other end provided with an eye 16.

17 indicates a hanger secured to the frame 1 and having a bearing 18 at its lower extremity.

19 indicates a pivot carried in the bearing 18.

20 indicates an arm swingably carried on the pivot 19, and having an eye 21 at one end and an enlarged portion 20* at the opposite end.

22 indicates a hole in the frame 1.

23 indicates a flexible cord secured at one end in the eye 16 of the arm 15, passing through the hole 22 and secured at its other end in the eye 21 of the arm 20.

24 indicates a battery.

25 indicates a magnet in proximity to the end 20* of the arm 20.

26 indicates a switch for making or breaking a circuit from the battery 24 through the magnet 25.

26* indicates a light spring secured to the arm 20 and to the frame 1.

27 indicates a coil spring under slight tension so as to have a tendency to unwind. One end of the spring 27 is secured in a hole 28 in the arm 4 and the other end is secured in a hole in the taper tube 2.

29 indicates a projection carried by the taper tube 2 slightly out of contact with the frame 1.

30 indicates a stop turnably secured by the pin 31.

Having described the principal parts involved in my invention, I will briefly describe the operation of the same.

After the mechanism of the turntable revolving device has been set ready for use the turntable 6 is started in motion. The taper tube 2 is then turned until the needle 10 comes into contact with the extreme outer edge of the playing portion of the record 7 at the same time turning the stop 30 on its pivot 31 so that it, the stop, is in contact with the projection 29 when the needle 10 is in the starting position on the record. The stop may be turned on pivot 31 to suit any size of record. The record is allowed to revolve until the selection is finished and then if it is desired to repeat it, or if at any intermediate point it is desired to start over the switch 26 is closed, thus closing the circuit through the battery 24 and energizing the magnet 25. The end 20* of the arm 20 is thus drawn up to the magnet 25 while the opposite end is lowered, drawing down on the cord 23 and pulling down the extending end of the arm 15. The pulling down of the extending end of the arm 15 turns the drum 12 on the pivot 11 and the projection 14 on the drum engaging with the projection 13 on the crook 8 turns the crook so that the sound box 9 is raised and the needle 10 is raised from the record. The spring 27 is very light and its torque has no effect whatever while the needle 10 is on the record 7, but when the needle is raised from the record by the magnetic means above described the taper tube which is delicately mounted in the collar 3 turns readily due to the unwinding tendency of the spring 27 until stopped by the projection 29 on the taper tube coming in contact with the stop 30. As may readily be seen the needle is now in a position directly above the starting point of the record because the stop 30 and the projection 29 were set in engagement for that position and therefore by opening the switch 26 the circuit through the battery 24 is broken and the needle comes into position for repeating the playing of the record. The spring 26* serves to keep the projections 13 and 14 in engagement with each other and permits the usual undulating movement of the needle over the surface of the record. The spring 26* also serves to restrain sudden falling of the needle 10 to the record when the contact 26

is broken. The connection shown whereby the projections 13 and 14 engage permits the sound box 10 being turned over in a vertical direction so as to rest on the tube 2 without turning down the arm 15 below the surface of frame 1.

By attaching a cord to each of the contacts of the switch 26 a person may be permitted to withdraw to some distance from the phonograph to better enjoy the music, and at the completion of a selection if it is desired to have it repeated it is only necessary to complete the circuit, wait a second or two to give time enough for the needle to travel from the center of the record to the edge and break the circuit, and the selection may be repeated thus as often as desired.

What I claim as my invention is:

1. In a phonograph, the combination with the sound box, sound box crook and supporting arm, of a drum carried by the sound box crook, an arm extending from the drum, electromagnetic means for drawing the outer end of the arm downwardly, manual means for making and breaking the circuit of the electromagnetic means, and means for carrying the arm back to the initial position.

2. In a phonograph, the combination with the sound box, sound box crook and supporting arm, of a drum carried by the sound box crook, an arm extending from the drum, electro-magnetic resiliently yieldable means for drawing the outer end of the arm downwardly, manual means for making and breaking the circuit of the electromagnetic means, and means for carrying the arm back to the initial position.

3. In a phonograph, the combination with the sound box crook, of a drum turnably carried thereby, an operating arm rigidly secured to the drum, means for depressing the arm to turn the drum and raise the crook, and inter-engaging means between the drum and the sound box crook adapted to permit of manually turning over the sound box crook of the operating arm.

DONALD MILNE MANSON.

Witnesses:

GERTRUDE NICHOLSON,
NELLIE ARNOLD.

METHOD OF PRODUCING DISK
SOUND RECORDS,

#1,206,034-----

J. Sanders,

Patented-Nov. 28th, 1916.

Filed-January 11th, 1913.

J. SANDERS.
METHOD OF PRODUCING DISK SOUND RECORDS.
APPLICATION FILED JAN. 11, 1913.

1,206,034.

Patented Nov. 28, 1916.
2 SHEETS—SHEET 1.

Fig. 1.

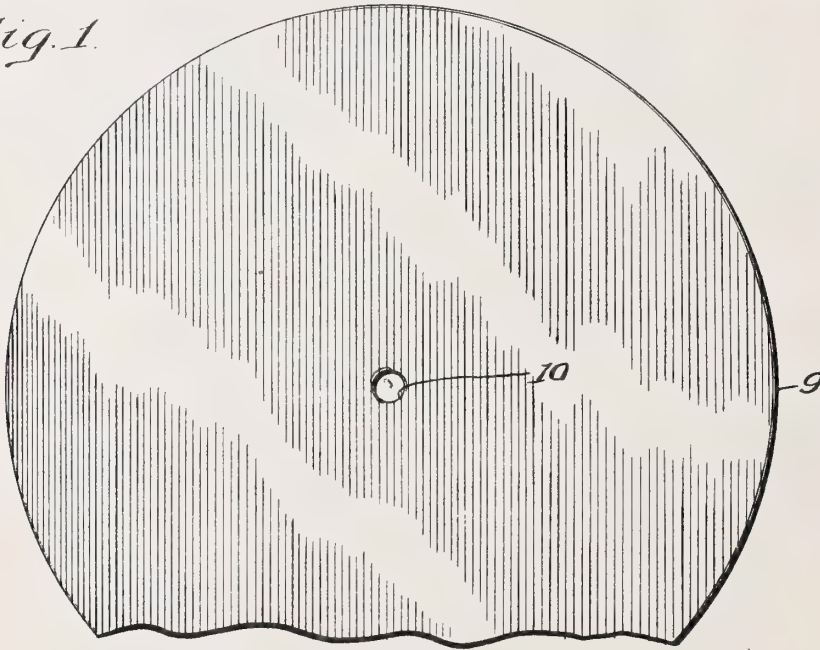
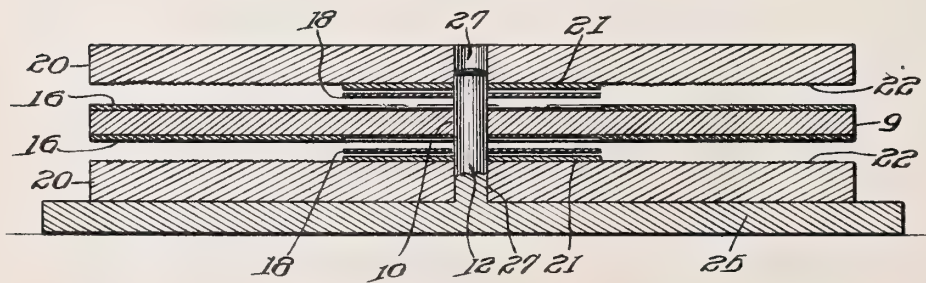


Fig. 2.



Fig. 6.



WITNESSES
F. J. Hartman.
J. Stuart Freeman.

BY

INVENTOR
Joseph Sanders.
Wm. F. Pitts,
ATTORNEY

J. SANDERS.
METHOD OF PRODUCING DISK SOUND RECORDS.
APPLICATION FILED JAN. 11, 1913.

1,206,034.

Patented Nov. 28, 1916.

2 SHEETS—SHEET 2.

Fig. 3

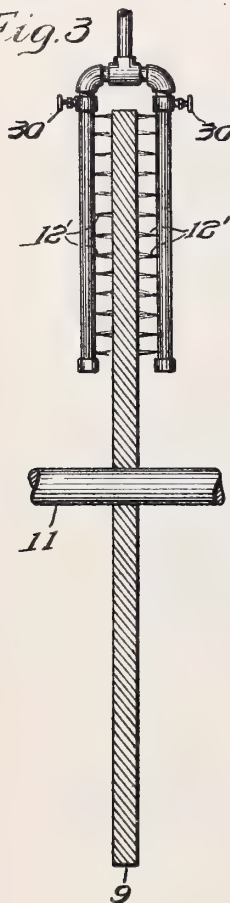


Fig. 4

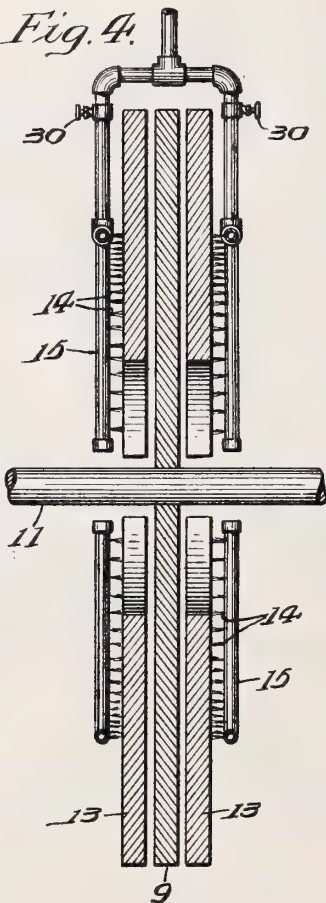


Fig. 5

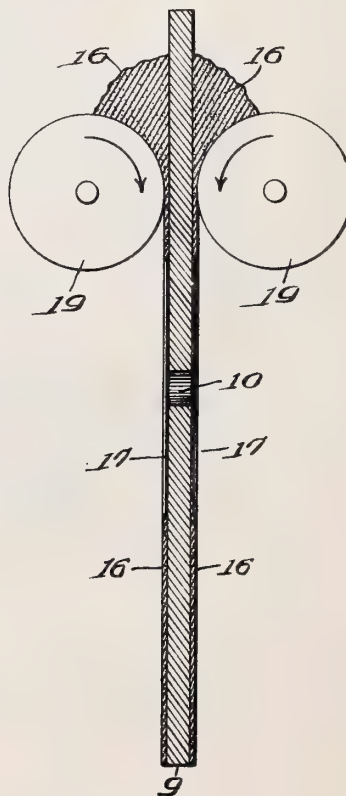


Fig. 7

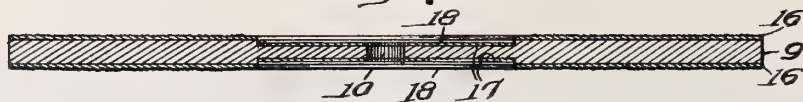


Fig. 8



WITNESSES

W. J. Hartman,
J. Stuart Freeman.

BY

INVENTOR
Joseph Sanders.

1 Mr. [Signature]

ATTORNEY

UNITED STATES PATENT OFFICE.

JOSEPH SANDERS, OF WASHINGTON, DISTRICT OF COLUMBIA.

METHOD OF PRODUCING DISK SOUND-RECORDS.

1,206,034.

Specification of Letters Patent.

Patented Nov. 28, 1916.

Application filed January 11, 1913. Serial No. 741,377.

To all whom it may concern:

Be it known that I, JOSEPH SANDERS, a citizen of the United States, and a resident of Washington, in the District of Columbia, have invented certain new and useful Improvements in Methods of Producing Disk Sound-Records, whereof the following is a full and complete description.

The object of this invention is to provide a non-frangible disk or tablet, capable of carrying upon one or both of its plane faces an undulatory record of sound.

Another object is to provide a method of producing a non-frangible record tablet for the purpose mentioned, which will make the cost of production of such tablet considerably less than that at which present forms of record tablets are produced.

Another object of this invention is to provide a record tablet comprising a fibrous base and a coating of sound record material covering substantially only that portion of said base which is designed to carry the record of sound.

Another object of this invention is to provide a non-frangible record tablet, comprising a thermo-plastic fibrous base, carrying upon a portion of one or both of its plane faces a coating or layer of thermoplastic material, embodying in its surface a substantially indestructible undulatory record of sound.

Another object is to provide a record disk or tablet comprising a base having its central portion compressed to form a recess for the identification label, the surface of which label when applied is depressed below the plane of the surrounding portion of said base, and consequently below the plane of the outer face of the coating of record material covering said surrounding portion.

Another object is to provide a built-up sound record disk, comprising a fibrous base partially or entirely covered by a layer of thermo-plastic record material, said disk when finished being markedly resonant, and having no deadening or dampening effect upon the reproduction of the sounds recorded in the face thereof.

In accordance with the present invention, the sound record disk or tablet comprises as a base a thermo-plastic fibrous disk. By the term "thermo-plastic fibrous disk," is meant a tablet containing sufficient fiber to render the finished record disk non-frangible, together with a sufficient quantity of a suitable

binder, employed for the purpose of unifying the fibrous structure, said binder being of a kind such as is plastic or pliable when heated, and solid and very hard when cold. With these elements in suitable proportions, and the application thereto of a predetermined amount of heat, the fibers comprising the structure are permitted to flow by the application of the pressure thereto, to readjust themselves to conform to the desired shape, imparted thereto while between molds or matrices; after which the binder upon hardening sets said fibrous structure permanently and substantially unyieldingly in the position which conforms to said matrices.

The basic disk is thoroughly permeated or saturated with a cement sizing which imparts thereto a bending coefficient, substantially equal to that of the surface coating which is later applied to one or both of the faces thereof, said surface coating in turn comprising a suitable thermo-plastic material capable of carrying in its surface an impression of undulatory sound record grooves. The sizing employed in said basic disk is preferably of a resinous nature, such for instance as resin or Manila gum, although other materials of the same general class may be used.

The surface coating, which is hereinafter termed record material, is of such a character that when cold it is able to successfully resist the wear of a steel or other suitable stylus point, used in connection with suitable mechanism for transforming the recorded sound waves into vibrations of the atmosphere. Said record material is composed generally speaking of shellac, earthy material and flock, and is preferably applied to the surface of the basic disk in a powdered form.

It has been found advisable to include in said material a suitable fiber, for the purpose of reinforcing the structure to resist lateral and transverse strains which may be exerted thereupon, said fiber in combination with a suitable resinous filler producing a structure which is thermo-plastic, while in applying the record material to the basic disk it is preferable for reasons hereinafter brought out to distribute the same in an annular zone concentric with said disk, and leave a central portion of said disk substantially free for the purpose of applying the usual identification label thereto.

For a complete understanding of this invention and the method in which the improved record disk is produced, reference is had to the accompanying drawings, in

5 which—

Figure 1 is a plan view of a basic disk; Fig. 2 is a diametrical section of the disk shown in Fig. 1; Fig. 3 is a diametrical section of the disk similar to Fig. 2 and showing the same when positioned between gas burners; Fig. 4 is a diametrical section of the disk similar to Fig. 2, and showing the same when positioned between a modified form of heating means; Fig. 5 is a diametrical view of said disk and rollers during the application thereto of record material; Fig. 6 is a sectional view showing the disk with its coating of rolled record material when positioned between a pair of opposed matrices; Fig. 7 is a sectional view of a completed double-faced sound record disk; and Fig. 8 is a similar sectional view of a single-faced sound record disk.

In carrying out the present invention, a disk of suitable fibrous material such as pulp-board, cardboard or the like is saturated with resin, Manila gum, or other suitable resinous sizing material, in any desired manner, to form a basic disk 9, care being taken that said disk is thoroughly impregnated with the sizing, yet without permitting a surplusage thereof to remain upon the surface. A disk, having been thus treated, is very hard and elastic when cold and somewhat thicker than the finished sound record after passing through the complete process as hereinafter described. Furthermore, a sized disk when cold offers great resistance to any unusual forces tending to distort it, and hence the finished record tablet is under all ordinary conditions of handling, practically indestructible, quite successfully resisting a tendency to break upon being dropped or upon the application thereto of pressures which would tend to distort the same. The basic disk 9 is at the outset generally provided with a central aperture 10 for the purpose of receiving the mandrel or spindle 11, when its surfaces are being heated, and subsequently the centering pin 12 in the mold, as well as to later receive the centering pin of the turntable of any common form of disk sound reproducing machine. This disk, as before stated, being hard and substantially unyielding when cold, must be softened throughout that portion of the surface thereof to which the powdered record material is to be applied, for the purpose of maintaining the same unitarily in conjunction therewith, such coöperation between said disk and record material being made possible by the fact that when heated the surface of the former becomes tacky or gummy. The softened surface of said disk then sticks to and retains a thin layer of said

finely divided record material, which, becoming softened by the heat radiated from the heated zone of the disk, in turn causes additional material, to adhere thereto, thus making an unbroken coating or layer of powdered record material upon the annular heated portion of the surface of the disk, the thickness of said coating being regulated, generally speaking, by the intensity and duration of the heat applied thereto, after which a surplus of the record material fails to adhere to the disk and subsequently falls off.

For the purpose of softening and rendering plastic a given annular portion of the disk 9, and at the same time permitting the central portion thereof to remain substantially cold and hard, there is provided suitable means for applying heat thereto. This means may take any desired form, such for instance as small jets 12' of flame, directed upon the desired portion, and within the range of which the disk is rotated, as shown in Fig. 3, or the disk as a whole may be rotated concentrically between and at a slight but uniform distance from, one or more similar, substantially flat, unbroken, annular plates 13, of substantially uniform thickness and of a metal having a high coefficient of heat conductivity, said plates in turn receiving their heat from jets of flame at the ports 14 in the annular pipes 15 in Fig. 4, or from an electric current, steam coil, or any other suitable source.

As a result of the close association of the disk 9 with the plates 13, the surface of that portion of said disk lying directly adjacent to or between the opposed surfaces of said plates, will become tacky and gummy, while the central portion of the disk, not being in close proximity to a source of heat, will remain comparatively cool and hard, though generally enough of the shellac, or other binder-containing record material 16 of the next step in the process, adheres thereto, to serve as a thin layer 17 of adhesive for the label 18, thus making it unnecessary to coat said central portion with shellac or similar material in a separate operation. However, the amount of powdered material adhering to the center is so slight as to be negligible when considering the increase in thickness of that portion of the disk. As a next step in the process after the disk 9 has been heated to a desired degree, said disk is removed from between the jets 12' or plates 13, and while still heated, a layer 16 of suitable record material is applied to the face thereof in any suitable manner, as by passing the disk with said material in a finely powdered form between carefully adjusted parallel rollers 19, as shown rather diagrammatically in Fig. 5. The record material generally employed comprises shellac, earthy material, such as baryta, infusorial earth, or the like, and finely divided fiber,

ordinarily termed flock, and after the disk has been passed through the rollers 19, any surplus of said material falls off as hereinbefore described. After said disk and coating have been passed through said rollers, it will be found that a homogeneous coating of record material covers an annular region of the disk from the circumference, substantially as far only as the inner diameter of that portion of the disk which was heated, but, as before stated, a relatively small amount of said material will have adhered to the central portion of the disk, to act as an adhesive for the label.

In coating the basic disk with record material, it has been found preferable to apply the same in powdered form, in view of the fact that an undue accumulation of flock is thus readily prevented. If, however, the record material be applied to the basic disk as a solution or liquid, care should be exercised to prevent an undue accumulation of said flock. The flock may be omitted, however, if desired, and the solution of record material may be applied to the blank in any suitable manner. In some cases it may be desirable to cement the record material in its powdery or finely divided form, to the surface of the disk base by applying to said base a suitable form of cement solution, but sufficient time should be allowed to permit of the proper drying of the cement, for unless the drying be thorough, difficulties may be experienced in the subsequent operations and a decrease in the normal life of a finished record may result. The invention is preferably carried out, however, by the use of an impregnated base, such as that described above, heated until its surface becomes sufficiently plastic, adhesive, or tacky, to cause a finely divided powdery record material to adhere thereto in a sufficient quantity as hereinbefore described.

In the production of homogeneous sound record disks, there is a sufficient flow of the record material to permit of the production of a sunken or depressed central portion, but when a fibrous base is employed there is no such pronounced flow of the material forming the base as there is in connection with the use of homogeneous sound records. This consequently makes it necessary or advisable to depress by compression the center of said disk sufficiently to accommodate the label. It is desirable therefore to provide a greater pressure to the central portion of the disk to which the identification label is affixed, than that applied over the major or greater portion of the surface of the record.

In accordance with the present invention, those portions of the basic disk to which a label or labels are to be applied, are left substantially free from the record material, and therefore the degree of compression re-

quired to depress the central portion of the disk is lessened beyond that which would be otherwise necessarily employed, and this lessened pressure upon the surface of the central portion of the disk is advantageous, in that the basic disk receiving directly that pressure is not subjected to the danger which might arise from distortions and transverse strains, or which might otherwise be experienced, if the said portions were covered with the record material co-extensive with the surrounding portions. This is particularly true in the case of double-faced records, where the thickness of the disk is decreased to a greater extent in the center, with respect to the marginal portions, than in the case of a single-faced record. Moreover, the saving in record material is no inconsiderable item when it is considered that sound record disks are produced by millions. The disk at this step in the process is bounded by smooth surfaces, and may then be placed between any two desired opposed matrices 20, as shown in Fig. 6, said matrices preferably having smooth central raised portions 21, which when compressed together to the fullest degree desired, will exert a compression upon the opposed central portions of the basic disk 9, upon which the labels 18 have been placed, said labels corresponding to the particular selections, the phonetic vibrations of which are recorded upon the surrounding surfaces 22 of the adjacent matrices. Thus, as the marginal surface 22 of each of the opposed matrices in the case of a double disk sound record impresses its respective undulatory characteristic upon the correspondingly situated record material 16, the central surfaces 21 of the matrices will simultaneously depress the central portion 23 of the surface of the disk 9 sufficiently to receive the labels 18, and also press the said labels 18 into their respective depressions and cause them to adhere thereto by virtue of the small amount of record material which has adhered thereto during the coating of said disk with record material, as hereinbefore described. While in some cases it may be possible to press a label directly upon the slightly heated central portion of the basic disk and have it remain in unitary relation therewith, a thin coating of shellac or other adhesive material may be applied to said surface, which operation is, however, eliminated by the adherence thereto of the thin coating 17 of record material.

The matrices 21 are applied to the disk 9, with its coating 16 in any suitable manner, either at different times or simultaneously. One method by which the operation may be performed is to place one matrix upon the usual heated bed 25, as shown in Fig. 6, with the centering pin 12 extending through the central bore 27. A label 18 identifying

the particular matrix is then placed thereupon, a disk 9 coated in the manner before described is then placed upon the label and upon a heated matrix, with the pin 12 passing through the aperture 10, a second label 18 is laid upon said disk, and a second heated matrix corresponding with said second label is placed in inverted position upon the pile, each element in turn being pierced by the pin 12. The necessary pressure generally hydraulic, is then applied to impress into the record material the record of sound, to depress the central portion of the record disk, and to attach the label to said central depressed portion. The compressed disk is then cooled in any suitable manner. The finished record so made will retain the shape into which it has been so molded, and will have the phonetic characteristics above referred to. The finished disk or record is shown in Fig. 7.

It has been found that by adjusting the valves 30, or other suitable means, the source of heat can be easily regulated, so as to finely adjust the amount of heat applied to the annular rings 13, while a disk is positioned therebetween, or directly to the basic disk by means of a flame, and by regulating the length of time that said disk is under the heating influence, it is possible to predetermine substantially the amount or thickness of the coating of record material, which will finally remain upon the annular marginal portion of said disk. In this connection it has been noted that the basic disk takes up and retains sufficient heat so that, while but a thin layer of the powdered record material initially adheres thereto, said initial amount is heated and softened by the heat conveyed thereto by said disk, and in turn heats and softens additional material, until substantially the predetermined thickness of the coating is reached, beyond which point a surplus of said record material fails to adhere to said disk and subsequently drops off.

When it is desired to make a single-faced record, that is to say, a tablet having a record of sound waves upon only one face thereof, a basic disk 9, previously prepared as hereinbefore described, is heated upon one side thereof, only slightly over the central portion but to a greater degree throughout the annular marginal portion surrounding said central portion.

This heating of the disk may be accomplished if desired by the use of the apparatus hereinbefore described, and as shown somewhat schematically in two forms in Figs. 3 and 4, respectively, in either of which cases one of the valves 30, or other suitable means may be closed against the passage of a suitable fluid therethrough, thus permitting only the face of said disk opposite thereto to become heated. It should be

stated, however, that when electricity is employed as a heating means, a switch, or variable resistance, may be substituted for the valves 30, to regulate the degree of heat in the necessary resistance coils.

After the necessary amount of heat has been applied to the basic disk, said disk may be coated with record material as hereinbefore described, and as shown rather schematically in one form in Fig. 5. In this case, however, the powdered material is pressed by rollers 19, or other suitable means, against one face only of the disk, the desired thickness of said record material which adheres to the superheated tacky annular portion of said disk, depending upon the amount of heat previously applied thereto, while but a very slight amount of said material adheres to the central portion whereon the usual label is placed, all surplus material falling off, as hereinbefore described.

In its present coated condition, and while still heated, or on being re-heated, if the same has cooled in storage, or in transit, the disk may have impressed upon its coated surface the desired record of sound waves by placing the same with its heated face uppermost directly upon the heated bed 25, the heated pin 12 extending through the aperture 10 in said disk; placing a label face upward centrally thereupon and surrounding the pin; then placing a matrix face downward upon and concentrically with said disk and label; and then applying pressure to the back or upper side of said matrix. After the characteristic irregularities of the matrix have been impressed in the record material on the surface of the disk, said disk may be removed from the matrix in any suitable or approved manner. The resulting record tablet shown in Fig. 8, comprises a smooth or blank lower surface, an upper face, embodying in an annular marginal portion thereof an undulatory record of sound waves, and a label firmly adhering to the central portion of said latter face and adapted to identify the particular vocal, instrumental, or other, selection which may correspond to the adjacent impressed record of sound.

It will be noted that one of the principal advantages of the process of forming sound record disks, as hereinbefore described, lies in the fact that, instead of a lump of thermoplastic material being compressed between a pair of heated matrices, or between a matrix and a heated table, thus causing said material to spread out under the action of heat and pressure toward the peripheral portions of the matrix, the blank in this invention is already of substantially the proper diameter before the application of the heated matrices and pressure thereto. Consequently, said blank is not substantially altered in shape, except

that under the great pressure employed, it may be somewhat condensed in a direction transverse to its plane, so that the finished record disk may be thinner than the original blank, although substantially of the same size diametrically. In this latter case the finished record disk or tablet is light in weight, very strong, and otherwise equal or possibly superior in acoustic properties to a tablet of solid or homogeneous material, while, substantially all transverse strains, with their consequent tendency to cause warping of the finished record disk, are eliminated.

One of the advantages in the process of making sound record tablets as above set forth, resides in the fact that it is not necessary to separately heat the powdered material or heat it prior to the application of the same to the surface of the tablet. If the tablet be heated sufficiently, the heat retained in the tablet may be sufficient to heat the powdered material applied thereto, and to cause the same to adhere to said tablet uniformly throughout that portion of the surface so heated. The body forming the base of the tablet should have sufficient stiffness or rigidity to retain its form even when heated sufficiently to be molded or receive the impression of the matrix.

Although a preferred embodiment of this invention in the art of disk sound records and the method of producing the same has been described, it is obvious that various changes might be made in the construction and process employed, without departing from the spirit of the invention or the scope of the appended claims.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States is:

1. The process of producing a sound record tablet, which consists in providing a thermoplastic fibrous basic disk, heating an annular marginal portion only of said disk corresponding approximately to the area exterior to and surrounding the label receiving central portion of the disk to a degree to cause applied record material to become adherent thereto, covering the heated area with record material and impressing a sound record matrix into the surface of said material.

2. The process of producing a sound record tablet, which consists in providing a thermoplastic basic disk, softening the surface of said disk, covering a portion of said surface with thermoplastic record material with the portion so covered localized to an annular band surrounding and exterior to the label receiving area of said surface, and impressing a matrix upon the surface of said record material.

3. The process of producing a sound record tablet, which consists in providing a thermoplastic fibrous basic disk, heating the

disk to a temperature rendering the surface adhesive with such heat so localized as to confine it to an annular zone exterior to the label receiving area and extending therefrom to the outer edge of the disk, covering the said heated surface with finely divided thermoplastic record material, and impressing a matrix upon the surface of said material.

4. The process of producing a sound record tablet, which consists in providing a basic disk of fibrous material rendered thermoplastic by incorporation therewith of a material capable of being softened and rendered adhesive by heat, heating a circumscribed area, thereof, extending substantially from the outer edge of the disk to the outer edge of the label receiving area of said disk to a temperature to render the surface adhesive, applying powdered record receiving material to the disk for adherence to the circumscribed heated area thereof, and impressing a matrix into sound record material so applied.

5. The process of producing a sound record tablet, which consists in providing a thermo-plastic basic disk, softening an annular marginal portion of the surface of said disk, covering said portion with finely divided thermo-plastic record material, and simultaneously subjecting said material and said disk to heat and pressure, impressing a matrix upon the surface of said material, and forcing the surface of the central portion of said disk out of the plane of the adjacent marginal portion.

6. The process of producing a sound record tablet, which consists in providing a thermo-plastic basic disk, softening an annular marginal portion of the surface of said disk, covering said portion with finely divided thermo-plastic record material, and simultaneously subjecting said material and said disk to the impress of a heated matrix to force the surface of the central portion of said disk out of the plane of the adjacent marginal portion, and affix a label to said central portion.

7. The process of producing a sound record tablet, which consist in providing a thermo-plastic basic disk, softening an annular marginal portion of the surface of said disk, covering said portion with thermoplastic record material, and simultaneously subjecting said material and said disk to heat and pressure, impressing a matrix upon the surface of said material, and depressing the surface of the central portion of said disk out of the plane of said marginal portion.

8. The process of producing a sound record tablet which consists in providing a thermo-plastic basic disk, softening an annular marginal portion of each of the opposed surfaces of said disk, covering said

portions with thermo-plastic record material, and simultaneously subjecting said material and said disk to heat and pressure, impressing a matrix upon each of the opposed surfaces of said material, and compressing the central portion of said disk to remove the oppositely disposed surfaces thereof out of the planes of the respectively adjacent marginal portions of said disk.

9. The process of producing a sound record tablet which consists, in providing a base with a coating of finely divided thermo-plastic record material, and impressing a matrix into the surface of said material while the latter is softened solely by heat supplied by the heated matrix.

10. The method of making a sound record tablet, which consists in directly heating an annular portion of a fibrous base provided with a resinous binder until said heated portion is tacky, said annular portion being exterior to the label receiving area of the tablet and then bringing a finely divided record material into intimate contact with said heated surface.

11. The method of making a sound record tablet, which consists in directly heating an annular portion of a fibrous base provided with a binder which softens under the influence of heat, until said heated portion is tacky, said annular portion being exterior to the label receiving area of the tablet and then bringing finely divided record material into contact with said heated surface, whereby said finely divided material adheres to said heated portion as a layer of finely divided record material.

12. The method of making a sound record tablet, which consists in heating an annular portion of a fibrous base provided with a binder which softens under the influence of heat until said heated portion is tacky and then rolling finely divided record material into intimate contact with said heated surface.

13. The process of producing a sound record tablet, which consists in providing a base that is thermo-plastic throughout, heating said base, and then discontinuing the heating and applying a powdered material to said base, while the latter is still hot said powdered material adhering to said base by reason of the heat stored in said base.

14. The method of making a sound record tablet, which consists in heating an annular portion of a fibrous base provided with a binder which softens under the influence of heat, to a greater degree than the inner portion of said disk within said annular portion is heated to render said annular portion more tacky than said inner portion, bringing a powdered record material into contact with the entire surface of said tablet to form an impressible layer of record material on

the said annular portion, and a relatively thin layer of adhesive material on said inner portion, and simultaneously impressing the sound record matrix into said annular layer of record material and pressing a label against and securing the same to said inner portion.

15. The method of making a sound record tablet, which consists in heating an annular portion of a fibrous base, provided with a binder which softens under the influence of heat, until said heated portion is tacky, simultaneously heating the inner portion of said tablet within said annular portion to a lesser degree than said annular portion is heated, and bringing a powdered record material into contact with the entire surface of said record, whereby an impressible layer of record material adheres to said annular portion to take an impression of a sound record matrix, and a relatively small amount of said record material adheres to said inner portion to form adhesive for a label.

16. The process of forming a sound record matrix, which consists in heating a fibrous base which is compressible under the influence of heat and pressure, applying to an annular portion of said base a coating of powdered record material, and to the central portion of said disk a layer of adhesive material, placing on said central portion a label, and simultaneously impressing a sound record matrix into said coated annular portion, and compressing said central portion to a greater degree than said annular portion of said tablet, to secure a label to the central portion of said tablet, and to depress said label below the plane of the surface of the finished record.

17. The method of making a sound record tablet, which consists in heating a fibrous base provided with a binder which softens under the influence of heat, until said heated portion is tacky, then removing the heated base from the source of heat, and then bringing a powdered record material into contact with said surface while hot enough to cause the record material to adhere.

18. The process of producing tablets for the reception of sound record impressions from matrices thereof which consists in providing a thermo-plastic fibrous base, softening the surface of said base throughout an annular area extending from the margin of the base toward but stopping short of the central label receiving portion thereof, then applying powdered sound record material to the softened surface and uniting the powdered material to the basic member by pressure.

19. The method of producing double faced sound record tablets which consists in providing a thermo-plastic fibrous base of a size substantially that of the finished tablet, ap-

plying to both faces thereof a sound record
receiving material throughout an annular
area substantially of the radial extent of the
face of the tablet outside of the label receiv-
5 ing portion and leaving the latter portion
substantially free from surfacing material,
and then impressing sound record matrices
simultaneously against opposite faces of the
tablet and at the same time compressing the
10 label receiving portion of the tablet below

the planes of the record groove receiving
portions of the tablet.

In witness whereof, I have hereunto set
my hand this ninth day of January, A. D.,
1913.

JOSEPH SANDERS.

Witnesses:

ALSTON B. MOULTON,
ALEXANDER PARK.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

TELEPHONIC FIRE ALARM APPARATUS,
#1,206,053-----E. L. Thompson,
Patented-Nov. 28th, 1916.
Filed-Nov. 14th, 1914
Renewed-Apr. 27th, 1916.

APPLICATION FILED NOV. 14, 1914. RENEWED APR. 27, 1916.

Patented Nov. 28, 1916.

2 SHEETS--SHEET 1.



E. L. THOMPSON.
TELEPHONIC FIRE ALARM APPARATUS.

APPLICATION FILED NOV. 14, 1914. RENEWED APR. 27, 1916.

1,206,053.

Patented Nov. 28, 1916.

2 SHEETS—SHEET 2.

Fig. 3.

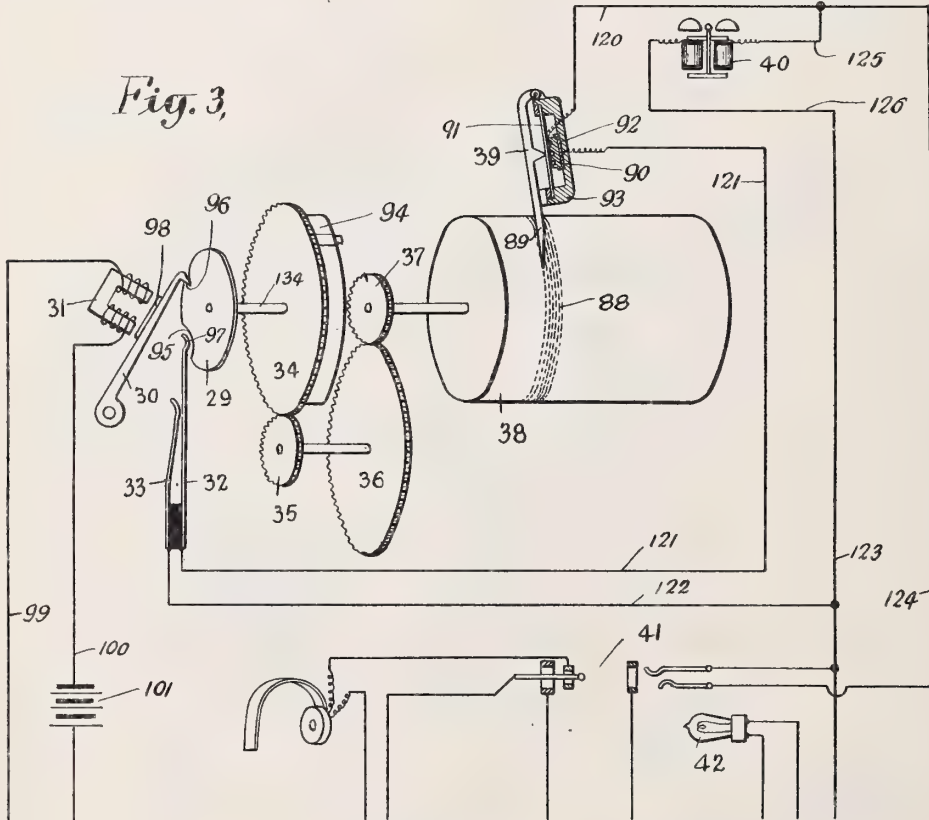
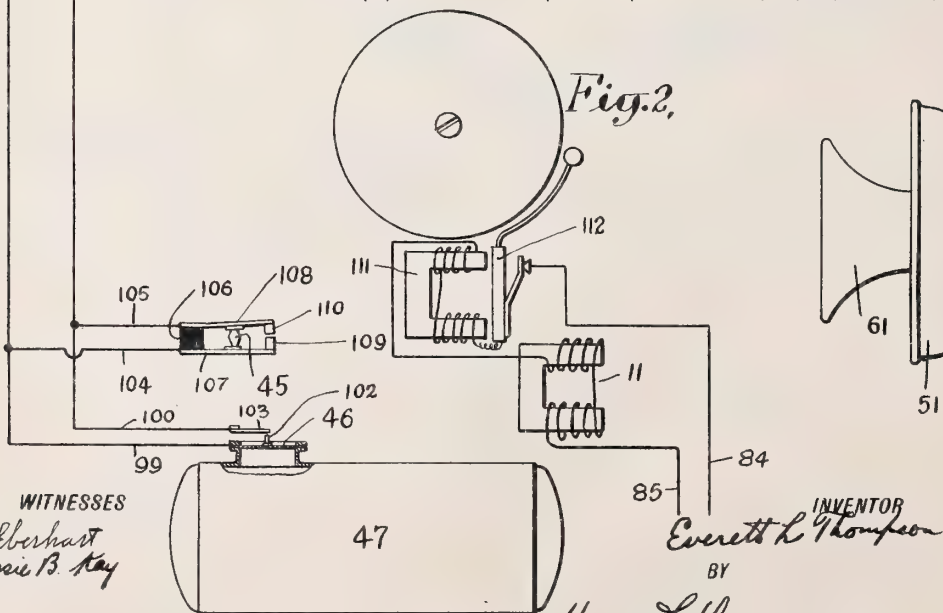


Fig. 2.



WITNESSES

Gilbert Hart
Jessie B. Ray

INVENTOR

Everett L. Thompson

BY

Harry L. Hume ATTORNEY

UNITED STATES PATENT OFFICE.

EVERETT L. THOMPSON, OF DOVER, NEW JERSEY, ASSIGNOR TO SYPHO-CHEMICAL SPRINKLER CORPORATION, OF CROTON-ON-HUDSON, NEW YORK, A CORPORATION OF NEW YORK.

TELEPHONIC FIRE-ALARM APPARATUS.

1,206,053. Specification of Letters Patent. Patented Nov. 28, 1916.

Application filed November 14, 1914, Serial No. 872,085. Renewed April 27, 1916. Serial No. 94,050.

To all whom it may concern:

Be it known that I, EVERETT L. THOMPSON, a citizen of the United States, and resident of Dover, county of Morris, and State of New Jersey, have made a certain new and useful Invention Relating to Telephonic Fire-Alarm Apparatus, of which the following is a specification, taken in connection with the accompanying drawing, which forms part of the same.

This invention relates especially to apparatus for automatically transmitting fire alarm signals over regular telephone circuits of any suitable character. A separate telephone connection may be provided, if desired, or if preferred a standard desk or other telephone set may be so arranged in connection with the alarm transmitting mechanism as to automatically call the central station operator in the event of fire or similar emergency and transmit thereto an articulate or other suitable danger signal.

In the accompanying drawings which show in a somewhat diagrammatic way illustrative embodiments of this invention Figure 1 is a perspective diagrammatic view showing one form of apparatus. Fig. 2 shows a modified arrangement for use in connection therewith; and Fig. 3 is another diagram showing a different form of alarm transmitting mechanism.

This invention comprises the use of any suitable alarm operating mechanism which is actuated in the event of fire or on the operation of suitable fire extinguishing apparatus which comes into action when fire occurs so that an articulate or any other suitable audible or other alarm signal may be transmitted over a telephone circuit after the central station operator has been called by this automatic alarm apparatus. The signal lights, annunciator drops or other indicating devices of the central station equipment enable the telephone operator to determine the subscriber's number and the location of the calling station, so that when a fire alarm signal of any suitable character is automatically transmitted in this way the location of the fire is definitely known as being on the subscriber's premises and the central station operator can thus communicate this information to the fire headquarters or other suitable fire control station. If desired, the alarm signal may be of an articulate character as by sending over the tele-

phone by means of a suitable phonograph the words "Fire here. Send in alarm," or some equivalent expression which can be automatically repeated in connection, if desired, with a periodic flashing of the signal light so as to continually call the attention of the central station operator to this alarm for any desired number of minutes while the alarm apparatus is in operation. It is not, however, necessary to use a phonographic or other articulate alarm signal since under fire emergency conditions the apparatus may, for instance, cause a bell to be rung in such way as to transmit this sound to the central station operator either in connection with a periodically repeated call signal or otherwise so as to make a distinctive and definite alarm signal to the operator which will show that a fire has occurred on the premises of that particular telephone subscriber. In this way the telephone circuits and central station equipment which are so widely installed can be efficiently utilized for the transmission of distinctive fire alarms and a corresponding advance made in the effectiveness of fire protection throughout many districts of the country.

In the form of apparatus shown diagrammatically in Fig. 1 a standard desk telephone set is shown as coöperating with the alarm transmitting mechanism and if desired this telephone set can be normally used throughout the day in the ordinary way for telephoning messages so long as the instruments are replaced in the alarm transmitting position indicated in connection with the other apparatus. In order to insure the proper position of the telephone instruments in this connection the casing is preferably provided with an upper portion or partition 62 which fits quite closely above the top of the transmitter 51, the mouth-piece of which is adapted to enter the flaring and alining end 19 of the alarm transmitting funnel which may be connected with the phonograph or other alarm mechanism. The regular support and base 1, 2 of the instrument may also coöperate with additional alining devices, such, for instance, as the alining socket 63 in the base portion 3 of the casing into which the base of the instrument may be first placed and then the transmitter swung forward beneath the partition or casing 62 until the mouth-piece enters the flaring funnel end 19. In this way

a definite positioning of the telephone instrument is secured and the hook or receiver support 4 is brought beneath the lifting call lever 5 and into proper coöperation therewith to be lifted by any suitable mechanism under emergency conditions. This calls the attention of the central station operator to this line and on plugging into the circuit in the usual way the operator at once hears the articulate or other alarm signal which is automatically transmitted over this line so that the definite fire alarm is automatically given to the operator in the telephone central station. As indicated the lifting call lever 5 which may be provided with a suitable frictional or irregular upper surface 74 to engage the telephone hook without undesirable slipping may be pivoted about the pin 73, for instance, and swung upward under emergency conditions by any suitable mechanism such as the pin 72 in the upper end 74 of this lever with which coöperates the slotted end 71 of the connector 6 which may be given a single or periodic oscillation by any suitable mechanism. As indicated the end of this connector may be operated by the crank pin or pivot 69 in the disk 8 which is automatically rotated by a suitable spring 9 on its shaft or stem 68 or by any other motor when the fire or other emergency condition occurs. As indicated the trigger arm 10 pivoted about the pin 76 has a retainer or hook end which coöperates with the retainer pin 70 in the disk 8 so as to normally prevent movement of these parts, but when released under emergency conditions the spring rotates the shaft 68 and the connected disk and pin so as to cause a reciprocation of the connector which forcibly raises the lifting call lever so as to raise the hook or receiver support of the telephone and give the usual call signal over the connected telephone circuit to the central station. If desired a suitable spring detent such as 7, may be used in connection with the call lever so that when it is raised the upper end of the lever is engaged and held by this detent in raised calling position so that the usual signal light is kept lighted on the central station switchboard. If, however, this detent is not used the call lever moves the telephone hook up and down periodically so as to give a periodic visual signal at the central station, the phonograph record being, of course, arranged so as to give the desired articulate signal when the hook is raised sufficiently to close the calling and transmitting circuit.

An articulate alarm signal may be transmitted over the telephone circuit by the use of any suitable phonograph mechanism which may, for instance, comprise a metallic or other disk record 16 preferably having a continuous or repeating sound groove 65 formed therein, so that the needle

64 of the phonograph travels around this record groove in the usual way until the inner groove is reached when a deeper or transfer groove such as 66, leads the needle out to the outer groove again so as to continuously repeat the articulate or verbal alarm signal which may be in any desired words. As indicated in connection with this record the alarm signal may, for example, be or comprise the words "Fire here. Send alarm", which would be continuously repeated so long as the phonograph disk was rotated. The other parts of the phonograph mechanism may be of any desired character and may comprise the usual sound box having a diaphragm 17 actuated by the needle 64 which is arranged in any desired way so as to follow the record groove, the sound being transmitted through the tone arm and into the flaring horn or passage 18 communicating with the telephone transmitter. It is also important that an alarm shall be given by the transmitting apparatus throughout the adjacent room or premises so as to notify the occupants of the danger of fire and in many cases such locally given articulate fire alarm signals are of considerable value without any telephone transmission thereof. If desired such local audible alarms may be readily given by providing another horn or passage 48 communicating with the tone arm and connected if desired with the upper portion of the transmitter casing as by having the end of this passage 49 secured thereto so that a large sound opening or horn 50 is provided and the articulate or other alarm signal made distinctly audible throughout the adjacent rooms of the building so that emergency measures may be taken by the occupants. It is of course desirable to have the size and character of these passages 18 and 48 so proportioned as to give throughout the adjacent portion of the building a loud alarm signal of sufficient intensity to wake such occupants as may be asleep, while at the same time the intensity of the sound in the telephone transmitter is not undesirably loud. It is of course in all cases unnecessary to have such closed sound passages between the phonograph and the telephone transmitter since the phonograph may be formed with a large horn or delivery opening through which the alarm signal is transmitted under emergency conditions and the telephone instrument may be located anywhere within reasonable distance where it can receive and transmit this articulate or other audible alarm signal to the central station. For this reason it is not in all cases necessary to have for this purpose any very definite positioning of the telephone instrument with respect to the transmitting devices, although it is desirable in most cases to insure proper co-

operation between the calling devices and the hook or other cooperating portion of the telephone instrument. This phonograph may be operated by any suitable gearing or mechanism such as the drive gear 12 on the shaft 68 operated by the spring 9 and this gear may be in mesh with the pinion 13 driving the intermediate gear 14 meshing with the pinion 15 on the shaft or stud 67 carrying the phonograph record 16. By such a spring motor the record may be continuously rotated for any desired number of minutes so as to keep repeating the alarm signal and insure its receipt by the operator of the central telephone exchange or other supervising station.

The automatic fire detecting or other alarm operating devices which effect the operation of this alarm transmitting mechanism may be of any desired or suitable character and may be arranged for actuation in case of an unusually high or rapid rise of temperature in any part of the protected premises, or in case of the operation of any automatic or other fire extinguishing apparatus located therein. As an example of these actuating devices an air alarm tube, such as 21, is shown diagrammatically as arranged to extend around various parts of the house and this tube is connected with an alarm casing 20 having therein the flexible actuating diaphragm 80 provided with the alarm contact 81. In the event of an unusually rapid rise of temperature the air in this small tube is expanded so rapidly as to force outward the diaphragm and connected contact so as to bring the latter into electrical contact with the cooperating contact member 82, thus completing the electric circuit through battery 83 and wires 84, 85 so as to actuate the alarm operating magnet 11 and swing over the armature 77 on the trigger arm 10 so as to release the connected transmitting mechanism. As usual in these air alarm devices a suitable leak or regulating connection 180 may be made between the tube and the outer air at any suitable point so as to take care of the normal gradual temperature changes and prevent their giving any alarm signals. Another form of actuating device is shown in connection with an automatic pressure tank such as the chemical mixing tank 22 which may be of the construction shown and described in the patents to Cooney, such as 1,075,017 of October 7, 1913, etc. This tank may communicate with a suitable distributing system comprising the riser or supply pipe 25 and the automatic sprinkler heads 28 arranged at suitable intervals about the building; and hose connections, such as 27, may also be provided at suitable points so as to come into operation when the connected valve 26 is opened. In the event of fire these devices operate automatically and the mixture of chemicals creates a high pres-

sure within the mixing tank 22 so that this fluid pressure may be readily transmitted to any part of the building through the connection or pipe 23. As indicated this pipe may communicate with the alarm actuating casing 24 having a resilient diaphragm 78 connected therewith so that under fire emergency conditions the fluid pressure will move this diaphragm to the left, thus forcing the connected stud or projection 79 against the end of the trigger arm and mechanically oscillating this arm so as to release the transmitting mechanism as previously described. The alarm transmitting device may also be operated on the emergency operation of any form of automatic sprinkler system by including in the actuating devices the alarm valves or other movable parts of any of the ordinary wet pipe or dry pipe sprinkler systems. For example, such a system as is shown and described in the Thompson Patent 734,049 of November 3, 1903, may be used for this purpose, the diaphragm circuit closer being available to give an electric alarm, and the water pipe connection used to operate the mechanical alarm is of course available to mechanically operate any portion of the transmitting devices or even to directly give the call signal over the telephone as by mechanically raising the telephone receiver as it rests on the hook of the instrument or more directly by raising the hook itself.

In case it is not desired to have an articulate alarm signal transmitted over the telephone circuit to the central station any other desired audible signal may be substituted and a corresponding change made in the alarm transmitting mechanism. Fig. 2 shows an arrangement in which a bell is used to give an alarm signal and this bell may be included in series in the alarm operating circuit 84, 85 shown in connection with Fig. 1, and thus give under fire or emergency conditions a loud alarm signal which is not only distinctly audible to the occupants of the adjacent premises, but also readily transmitted through a telephone instrument anywhere in the neighborhood so as to give an alarm to the central station operator. The bell magnet 111 is so connected as to be intermittently energized because of the usual interrupter included in this circuit so as to intermittently attract its armature 112 and continuously ring the operating bell in the usual way as long as the battery or other source of electricity remains effective. As indicated this bell may be mounted in any desired way in the vicinity of the mouth-piece 61 of the telephone transmitter 51 so as to transmit this loud distinctive audible alarm signal over the telephone circuit under such emergency conditions after the calling devices operate.

If desired the alarm signals may be trans-

mitted over the regular telephone circuits by the use of a special telephone transmitting device which may be connected to the telephone circuits in the subscriber's house.

- 5 Fig. 3 shows diagrammatically such an arrangement which may comprise a phonograph where articulate signals are desired. As indicated the phonograph cylinder may be provided with a record groove 88 preferably of a repeating character so that the coöperating needle or stylus 89 continuously travels this record and transmits the vibrations corresponding to the desired verbal message to a microphone or other telephone transmitting device of any suitable character. As indicated the stylus lever 39 may coöperate with a diaphragm 91 coöperating with a granular or other microphone transmitter element 90, the other terminal being indicated as composed of a metallic plate 92. The vibrations caused in this way in the lever 39 thus alter the electrical resistance between these two contacts and allow an oscillatory current to pass between the connected wires 120, 121 when this circuit is closed. Normally, however, this circuit is open and the shunt high resistance circuit across the outside telephone line 123, 124 is normally maintained through a high resistance of any character, such for instance, as the signal bell 40, this shunt circuit being shown as comprising the wires 125 and 126 on either side of this bell.

- Under fire emergency conditions the telephone call and transmitting circuit through the microphone is automatically closed so as to give at the central station any desired visual or other call signal which may be made distinctive by giving it a periodic or repeating character, and at the same time the phonograph is set in operation to give any desired articulate or other alarm signal over the telephone circuit so as to be received by the central station operator. This may be effected by the mechanism diagrammatically illustrated as comprising the spiral spring or other motor device 94 arranged on the shaft 134 carrying the gear 34 so that the spring tends to rotate this shaft and gear. Their rotation is, however, normally prevented by a suitable device which may comprise the notch 96 in the connected disk 29 with which the trigger arm or lever 30 normally coöperates as indicated. When, however, this trigger is electrically or mechanically withdrawn from the notch the disk and connected parts are set in rotation by the spring and through any suitable gearing the phonograph may be continuously operated for the desired time. The gear 34, for instance, may be in mesh with the pinion 35 carrying on the same shaft the intermediate gear 36 which may mesh with the pinion 37 secured to the phonograph record cylinder 38. The tele-

phone call circuit may be simultaneously operated by any connected mechanism and if desired this may be effected by suitable contacts coöperating with the disk 29 which for this purpose may be formed with a suitable recess 95. The spring contact 32 normally lies within this recess so as to be out of contact with the coöperating spring member 33 and break the circuit between the wires 121, 122. When, however, the disk rotates under emergency conditions the contacts are brought together and held in electrical contact whenever the normal circumference of this disk 29 engages the end of the spring contact 32. In this way the central station signal light, such as 42, may be periodically illuminated and extinguished for short periods once or twice for every revolution of the disk 29, the retainer notch 96 being if desired made of sufficient size to allow the momentary extinguishing of this light as it passes slowly under the contact 32. In this way a periodic distinctive flashing of the signal light is caused and simultaneously an articulate or verbal signal is transmitted to the central station by the phonograph which may be so timed as to repeat the desired words during the period when the telephone call and transmitting circuit is automatically closed by this mechanism. Thus the operator's attention having been called to this line and the operator's circuit plugged in by the usual plug and connections 41 this signal may be received and the fire alarm transmitted by the central station operator or other supervising authority to the desired parties, the telephone operator preferably where possible calling up the occupants of the premises from which any such alarm has been received and ascertaining the extent or location of the fire, etc., before sending in the alarm to the fire department or in connection therewith.

The alarm devices for actuating this alarm mechanism may be of any suitable character whatever and may for example comprise electrical or other connections with a pressure tank, such as 47, which may be of the chemical mixing type referred to in the Cooney patents. This tank may, for example, be provided with a flexible diaphragm 46 so that under emergency conditions the increased pressure forces upward this diaphragm and the connected stud 102 which thus makes contact with the coöperating spring contact 103 and closes the circuit 99, 100 through the battery 101 so as to energize the operating magnet 31 and attract the armature 98 which as indicated may be directly connected to the trigger arm 30. Other thermal or emergency detector devices may also be used, such for instance, as the fusible link device indicated as comprising the spring arms 107, 108 secured to the

insulating block 106 and provided at their outer ends with suitable electrical contacts 109, 110. These contacts are normally kept apart by a fusible link 45 comprising suitable solder or the like, which is adapted on a dangerous rise of temperature, to soften or melt so as to release this link and allow the contacts to be brought together. This closes the alarm actuating circuit between the wires 104, 105 which are in shunt around the other alarm circuit and serve to actuate in the same way the alarm operating magnet 31 and withdraw the trigger arm so as to allow the alarm transmitting mechanism to operate as previously described.

Having described this invention in connection with a number of illustrative embodiments, forms, arrangements, materials, parts and methods of operation, to the details of which disclosure the invention is not of course to be limited, what is claimed as new and what is desired to be secured by Letters Patent is set forth in the appended claims.

1. In telephonic fire alarm apparatus, an alarm transmitting mechanism comprising a casing provided with an alining socket adapted to receive the base of a portable telephone instrument, a cooperating alining portion to prevent insertion of the instrument until its base has been inserted in said socket, a sound passage having an alining flaring end to receive the transmitter mouth-piece of the telephone instrument and hold the same in substantial alinement, a phonograph having a repeating articulate disk record and cooperating transmitting mechanism to transmit an articulate alarm signal through said sound passage, calling devices cooperating with said telephone instrument and comprising a lifting call lever to lift the telephone hook, a detent cooperating with said call lever to hold the same in calling position, a motor mechanism to simultaneously operate said phonograph and said calling devices, a retainer device normally keeping said motor mechanism inoperative, and alarm operating devices cooperating with said retainer mechanism and comprising an alarm operating magnet and connected detector devices and an alarm operating diaphragm and connected emergency alarm devices adapted to be actuated when a connected fire extinguisher system is in emergency operation.

2. In telephonic fire alarm apparatus, an alarm transmitting mechanism comprising a casing provided with an alining socket adapted to receive the base of a portable telephone instrument, a sound passage having an alining flaring end to receive the transmitter mouth-piece of the telephone instrument and hold the same in substantial alinement, a phonograph having a repeating articulate record and cooperating trans-

mitting mechanism to transmit an articulate alarm signal through said sound passage, calling devices cooperating with said telephone instrument and comprising a lifting call lever to lift the telephone hook, a detent cooperating with said call lever to hold the same in calling position, a motor mechanism to simultaneously operate said phonograph and said calling devices, a retainer device normally keeping said motor mechanism inoperative, and alarm operating devices cooperating with said retainer mechanism and comprising connected emergency alarm devices adapted to be actuated when a connected fire extinguisher system is in emergency operation.

3. In telephonic fire alarm apparatus, an alarm transmitting mechanism comprising a casing adapted to receive the base of a portable telephone instrument, a sound passage having an alining flaring end to receive the transmitter mouth-piece of the telephone instrument and hold the same in substantial alinement, a phonograph having a repeating articulate record and cooperating transmitting mechanism to transmit an articulate alarm signal through said sound passage, calling devices cooperating with said telephone instrument, a detent cooperating with said call lever to hold the same in calling position, a motor mechanism to simultaneously operate said phonograph and said calling devices, a retainer device normally keeping said motor mechanism inoperative, and alarm operating devices cooperating with said retainer mechanism.

4. In telephonic fire alarm apparatus, an alarm transmitting mechanism comprising a casing adapted to receive the base of a portable telephone instrument, a sound passage having an alining flaring end to receive the transmitter mouth-piece of the telephone instrument and hold the same in substantial alinement, a phonograph having a repeating articulate record and cooperating transmitting mechanism to transmit an articulate alarm signal through said sound passage, calling devices cooperating with said telephone instrument, a motor mechanism to simultaneously operate said phonograph and said calling devices, a retainer device normally keeping said motor mechanism inoperative, and alarm operating devices cooperating with said retainer mechanism.

5. In telephonic fire alarm apparatus, a portable telephone instrument and a connected telephone circuit and central station, an alarm transmitting mechanism comprising alining means including a sound passage having an alining flaring end to receive the transmitter mouth-piece of the telephone instrument and hold the same in substantial alinement, a phonograph having a repeating articulate record and cooperating transmitting

mechanism to transmit an articulate alarm signal through said sound passage, calling devices coöperating with said telephone instrument and comprising a lifting call lever
 5 to lift the telephone hook, motor mechanism to simultaneously operate said phonograph and said calling devices and transmit a periodic call signal and an articulate alarm signal over the telephone circuit, a retainer
 10 device normally keeping said motor mechanism inoperative, and automatic fire alarm actuating devices coöperating with said retainer mechanism.

6. In telephonic fire alarm apparatus, a
 15 portable telephone instrument and a connected telephone circuit and central station, an alarm transmitting mechanism comprising alining means including a sound passage having an alining flaring end to receive the
 20 transmitter mouth-piece of the telephone instrument and hold the same in substantial alinement, a phonograph having a repeating record and coöperating transmitting mechanism to transmit an alarm signal through
 25 said sound passage, calling devices coöperating with said telephone instrument, motor mechanism to simultaneously operate said phonograph and said calling devices and transmit a periodic call signal and an alarm
 30 signal over the telephone circuit, a retainer device normally keeping said motor mechanism inoperative, and automatic fire alarm actuating devices coöperating with said retainer mechanism and comprising an actuating diaphragm and a connected chemical pressure
 35 tank supplying extinguishing liquid to an automatic sprinkler system under fire emergency conditions.

7. In telephonic fire alarm apparatus, a
 40 portable telephone instrument and a connected telephone circuit and central station, an alarm transmitting mechanism comprising a sound passage to coöperate with the transmitter mouthpiece of the telephone instrument, a phonograph having a repeating
 45 record and coöperating transmitting mechanism to transmit an alarm signal through said sound passage, calling devices coöperating with said telephone instrument, motor mechanism to simultaneously operate said
 50 phonograph and said calling devices and transmit a periodic call signal and an alarm signal over the telephone circuit, a retainer device normally keeping said motor mechanism inoperative, and automatic fire alarm
 55 actuating devices coöperating with said retainer mechanism and comprising an actuating diaphragm and a connected chemical pressure tank supplying extinguishing liquid to an automatic sprinkler system under fire
 60 emergency conditions.

8. In telephonic fire alarm apparatus, an alarm transmitting mechanism comprising alining means for a portable telephone in-
 65 strument including a sound passage having

an alining flaring end to receive the transmitter mouth-piece of the telephone instrument and hold the same in substantial alinement, a phonograph having a repeating articulate record and coöperating transmitting
 70 mechanism to transmit an articulate alarm signal through said sound passage, calling devices coöperating with said telephone instrument and comprising a lifting call lever to lift the telephone hook, motor mechanism
 75 to simultaneously operate said phonograph and said calling devices and transmit a periodic call signal and an alternating articulate alarm signal over the telephone circuit, and automatic fire alarm actuating devices
 80 to effect the operation of said motor mechanism.

9. In telephonic fire alarm apparatus, an alarm transmitting mechanism comprising a sound passage to coöperate with the trans-
 85 mitter mouth-piece of a telephone instrument, a phonograph having a repeating articulate record and coöperating transmitting mechanism to transmit an articulate alarm signal through said sound passage, calling
 90 devices coöperating with said telephone instrument and comprising a lifting call lever to lift the telephone hook, motor mechanism to simultaneously operate said phonograph and said calling devices and transmit a pe-
 95 riodic call signal and an alternating articulate alarm signal over the telephone circuit, and automatic fire alarm actuating devices to effect the operation of said motor mechanism.

10. In telephonic fire alarm apparatus, an alarm transmitting mechanism comprising a sound passage to coöperate with the trans-
 100 mitter mouth-piece of a telephone instrument, a phonograph having a repeating articulate record and coöperating transmitting mechanism to transmit an articulate alarm signal through said sound passage, calling
 105 devices coöperating with said telephone instrument, motor mechanism to simultaneously operate said phonograph and said calling devices and transmit a periodic call signal and an alternating articulate alarm signal over the telephone circuit, and fire alarm
 110 actuating devices to effect the operation of said motor mechanism and comprising an automatic fire extinguishing system and a connected chemical pressure tank to supply extinguishing liquid to said system under
 115 fire emergency conditions and a pressure operated actuating device connected to said tank and effecting the operation of said motor mechanism when an emergency pressure is developed in said tank.

11. In telephonic fire alarm apparatus, an
 125 alarm transmitting mechanism comprising a sound passage to coöperate with the transmitter mouth-piece of a telephone instrument, a phonograph having a repeating record and coöperating transmitting mecha-
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nism to transmit an articulate alarm signal through said sound passage, calling devices cooperating with said telephone instrument, motor mechanism to simultaneously operate
 5 said phonograph and said calling devices and transmit a periodic call signal and an alternating alarm signal over the telephone circuit, and fire alarm actuating devices to effect the operation of said motor mechanism
 10 and comprising an automatic fire extinguishing system and a connected chemical pressure tank to supply extinguishing liquid to said system under fire emergency conditions and a pressure operated actuating device
 15 connected to said tank and effecting the operation of said motor mechanism when an emergency pressure is developed in said tank.

12. In telephone fire alarm apparatus, an alarm transmitting mechanism comprising
 20 a sound passage having an alining flaring end to cooperate with the transmitter mouth-piece of a telephone instrument and hold the same in substantial alinement with respect thereto, means to produce and to
 25 transmit a repeating articulate alarm signal through said sound passage, calling devices cooperating with said telephone instrument and comprising a lifting call lever to lift the telephone hook, motor mechanism
 30 to simultaneously operate said transmitting and said calling devices and transmit a periodic call signal and an alternating audible alarm signal over the telephone circuit, and fire alarm actuating devices located
 35 on the same premises as said telephone and automatically operated in the event of fire to actuate said motor mechanism.

13. In telephone fire alarm apparatus, an alarm transmitting mechanism comprising
 40 a sound passage to cooperate with the transmitter mouth-piece of a telephone instrument, means to produce and to transmit a repeating articulate alarm signal through said sound passage, calling devices cooperating
 45 with said telephone instrument, motor mechanism to simultaneously operate said transmitting and said calling devices and transmit a periodic call signal and an alternating audible alarm signal over the tele-
 50 phone circuit, and fire alarm actuating devices located on the same premises as said telephone and automatically operated in the event of fire to actuate said motor mechanism.

14. In telephone fire alarm apparatus, a portable telephone instrument and a connected telephone circuit and central station, an alarm transmitting mechanism comprising a sound passage having an
 60 alining flaring end to cooperate with the transmitter mouth-piece of said telephone instrument and hold the same in substantial alinement with respect thereto, means to produce and to transmit a repeating audible alarm signal through said sound pas-

sage, calling devices cooperating with said telephone instrument and comprising a lifting call lever to lift the telephone hook, motor mechanism to simultaneously operate said transmitting and said calling de-
 70 vices and transmit a periodic call signal and an alternating audible alarm signal over the telephone circuit and fire alarm actuating devices located on the same premises as said telephone and automatically operated
 75 in the event of fire to actuate said motor mechanism.

15. In a telephone fire alarm apparatus, a telephone instrument and a connected tele-
 80 phone circuit and central station, an alarm transmitting mechanism comprising a sound passage to cooperate with said telephone instrument, means to produce and to transmit an audible alarm signal through said sound
 85 passage, calling devices cooperating with said telephone instrument, motor mechanism to simultaneously operate said transmitting and said calling devices, and fire alarm actuating devices located on the same premises
 90 as said telephone and automatically operated in the event of fire to actuate said motor mechanism and comprising an automatic fire extinguishing system and a connected gaseous pressure tank to supply extinguish-
 95 ing liquid to said system under fire emergency conditions and a pressure operated actuating device connected to said tank and effecting the operation of said motor mechanism when an emergency pressure is de-
 100 veloped in said tank.

16. In telephonic fire alarm apparatus, a telephone instrument and connected telephone circuit and central station, an alarm transmitting mechanism adapted to send an articu-
 105 luate alarm signal over said telephone circuit, calling devices cooperating with said circuit and periodically operating automatic alarm actuating devices comprising connected emergency devices including a chemical fluid supply tank adapted to be actuated
 110 when a connected fire extinguisher system is in emergency operation to thereupon effect the periodic alternate operation of said transmitting and calling devices.

17. In telephonic fire alarm apparatus, a
 115 telephone circuit and connected telephone central station, an alarm transmitting mechanism adapted to send an articulate alarm signal over said telephone circuit, calling devices cooperating with said circuit and periodically operating automatic alarm actuating devices comprising connected emer-
 120 gency devices including a gaseous pressure liquid supply tank adapted to be actuated when a connected fire extinguisher system is in emergency operation to operate said transmitting mechanism and to effect the periodic operation of said calling devices.

18. In telephonic fire alarm apparatus, an alarm transmitting mechanism adapted to
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send an audible alarm signal over a telephone circuit, and to give an audible alarm signal throughout the premises adjacent said alarm transmitting mechanism, calling devices coöperating with said circuit and periodically operating automatic alarm actuating devices comprising connected emergency devices including a chemical fluid supply tank adapted to be actuated by the increased pressure from said supply tank when a connected fire extinguisher system is in emergency operation to thereupon effect the periodic alternate operation of said transmitting and calling devices.

19. In telephonic fire alarm apparatus, an alarm transmitting mechanism adapted to send an audible alarm signal over a telephone circuit and to give an audible alarm signal throughout the premises adjacent said alarm transmitting mechanism, calling devices coöperating with said circuit and alarm actuating devices including a gaseous pressure liquid supply device and a connected automatic distributing system adapted to be actuated automatically under fire emergency conditions to thereupon effect the operation of said transmitting and calling devices.

20. In telephonic fire alarm apparatus, a telephone circuit and connected telephone central station, an alarm transmitting mechanism adapted to send an alarm signal over

said telephone circuit and to give an audible alarm signal throughout the premises adjacent said alarm transmitting mechanism, and automatic alarm actuating devices including a gaseous pressure liquid supply device and a connected automatic distributing system to effect the operation of said transmitting devices.

21. In telephonic alarm apparatus, alarm actuating devices comprising an automatic sprinkler distributing system and a connected chemical pressure tank to be actuated under fire emergency conditions and coöperating telephone transmitting mechanism operated by the increased emergency pressure in said actuating devices to send an alarm signal over a telephone circuit to a telephone central station.

22. In fire alarm apparatus, alarm actuating devices including a fluid pressure supply tank connected to a fire extinguishing system to be automatically actuated under fire emergency conditions and coöperating transmitting mechanism operated by said actuating devices to thereupon send electrically an articulate alarm signal over a circuit to a distant receiving station.

EVERETT L. THOMPSON.

Witnesses:

C. N. FULLER,
S. J. RICHARDS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

REPRODUCER ATTACHMENT,
#1,206,168-----C.E.Tackmann,
Patented-Nov.28th,1916.
Filed-May 8th, 1915.

C. E. TACKMANN.
REPRODUCER ATTACHMENT.
APPLICATION FILED MAY 8, 1915.

1,206,168.

Patented Nov. 28, 1916.

FIG. 1.

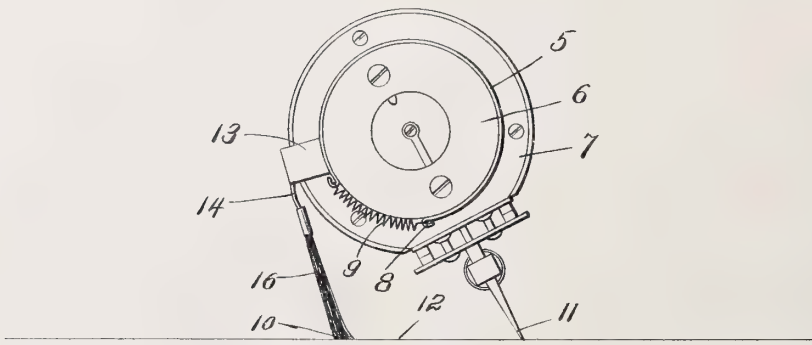
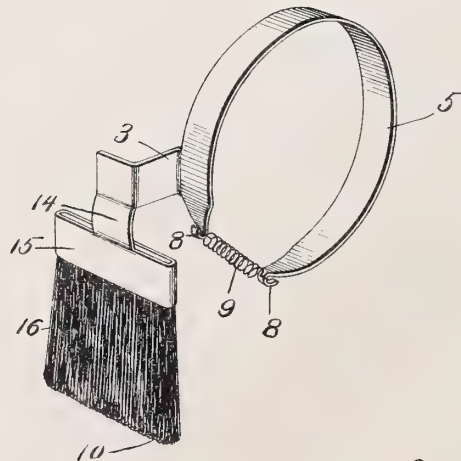


FIG. 2.



Witnesses

A. C. Newkirk
Edward J. Jager

Inventor
Carl E. Tackmann

By Victor J. Evans
Attorney

UNITED STATES PATENT OFFICE.

CARL E. TACKMANN, OF COLUMBUS, OHIO.

REPRODUCER ATTACHMENT.

1,206,168.

Specification of Letters Patent.

Patented Nov. 28, 1916.

Application filed May 8, 1915. Serial No. 26,815.

To all whom it may concern:

Be it known that I, CARL E. TACKMANN, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented new and useful Improvements in Reproducer Attachments, of which the following is a specification.

The present invention contemplates the provision of an attachment for the reproducer of a Victrola, phonograph, or the recorder of machines of this character, in the nature of a brush adapted to bear lightly upon the record surface to clean the latter as the needle travels through the grooves in the record.

The invention aims to provide a device of this character which is simple in construction, capable of being readily and easily associated with or removed from the reproducer when desired, and when in place positively holds the brush in proper position with respect to the needle and record surface, as well as being highly ornamental in appearance.

The nature of the invention will be better understood from the following description, wherein the structure is set forth in detail, the invention residing in the construction, combination and arrangement of parts as claimed.

In the drawing forming part of this application, like numerals of reference indicate similar parts in the several views and wherein:

Figure 1 is an elevation of the reproducer showing my invention applied thereto. Fig. 2 is a perspective view of the attachment.

While I have shown my invention used in connection with a reproducer of a Victrola, it is to be understood that the same is susceptible of use in connection with either a recorder or reproducer of machines of this character. However in the specific embodiment of the invention as illustrated, the same comprises an expansible band 5 adapted to circumscribe the rubber disk 6 usually arranged upon the rear face of the sound box 7. The adjacent ends of the band are curved outwardly to define the hooks 8, which latter are detachably connected with the opposite ends of a coil spring 9, the spring operating to hold the band 5 against movement with a view to preventing de-

55 rangement of the attachment upon the sound box, whereby the brush 10 is always maintained in proper position with respect to both the needle 11 and the record surface 12.

The band adjacent one of its ends is formed to provide a right angularly disposed arm 13, which latter at its free end is extended downwardly as at 14 terminating to provide a brush stock 15, with which the bristles 16 are associated in any suitable manner. By reason of this construction it will be manifest that the brush is disposed to lightly bear against the record surface 12 at a point in the rear of the needle 11, thereby maintaining the record perfectly clean as the needle travels through the grooves in the record.

The attachment can be constructed from any suitable material in various sizes, and either gold or nickel-plated to correspond with the particular style of machine with which it is intended to be used, which renders the attachment highly ornamental in appearance when in place upon the machine.

It is believed that from the foregoing description, the nature and advantages of the invention will be thoroughly understood without requiring a more extended explanation and therefore the same has been omitted. However I desire to have it understood that such various changes in the construction and arrangement of parts may be resorted to when desired as fall within the scope of the appended claim.

What is claimed is:—

An attachment of the class described constructed from a single piece of resilient material, and embodying a split band terminating to provide oppositely disposed hooks, a substantially L-shaped arm projecting from one edge of the band immediately adjacent one of said hooks, the vertical branch of said arm extending below said hook and terminating to provide an elongated loop, bristles clamped between the walls of said loop, and a coil spring having its opposite ends connected with said hooks for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CARL E. TACKMANN.

Witnesses:

FRANK J. KAUFMAN,
E. E. LERCH.

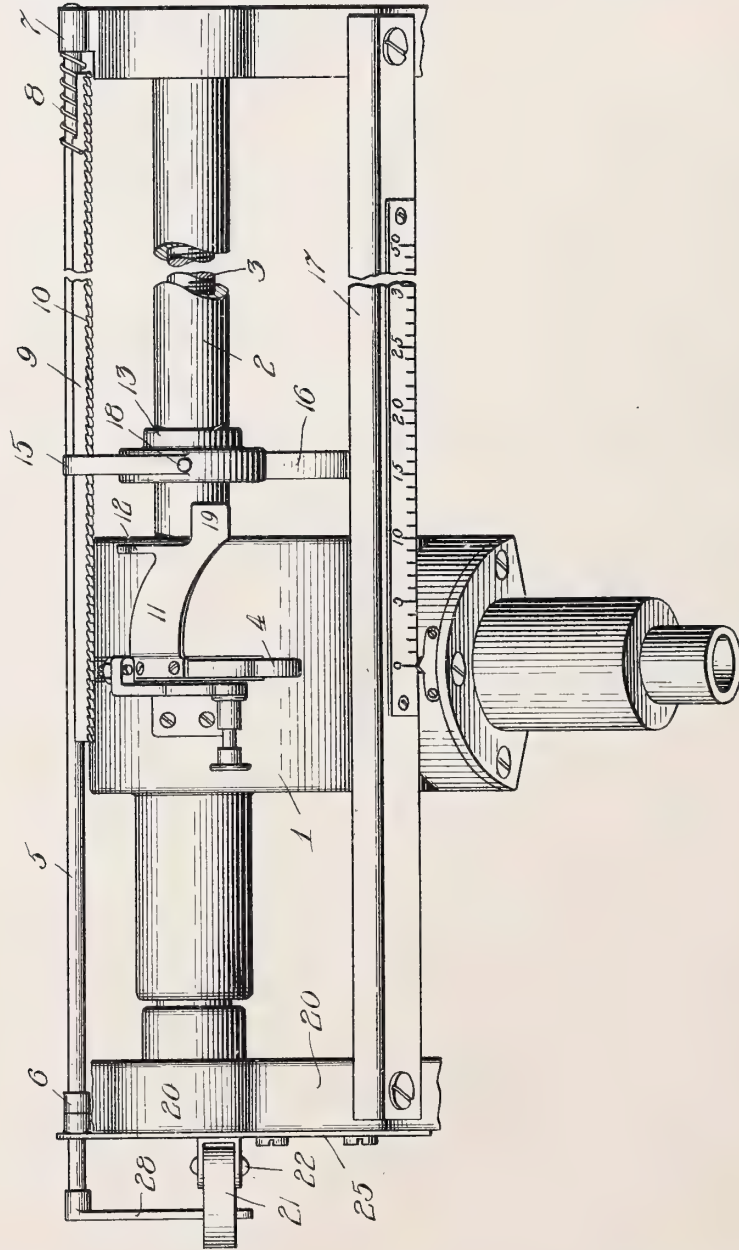
AUTOMATIC ALARM FOR DICTATING MACHINES,
#1,206,462-----S. C. Nott,
Patented-November 28th, 1916.
Filed-December 4th, 1915.

S. C. NOTT.
 AUTOMATIC ALARM FOR DICTATING MACHINES.
 APPLICATION FILED DEC. 4, 1915.

1,206,462.

Patented Nov. 28, 1916.
 4 SHEETS—SHEET 1.

Fig. 1.



Witness

Harry S. Gaither

by

Chamberlin & Henderson

Attys

Inventor:
S. C. Nott

1,206,462.

4 SHEETS—SHEET 2.

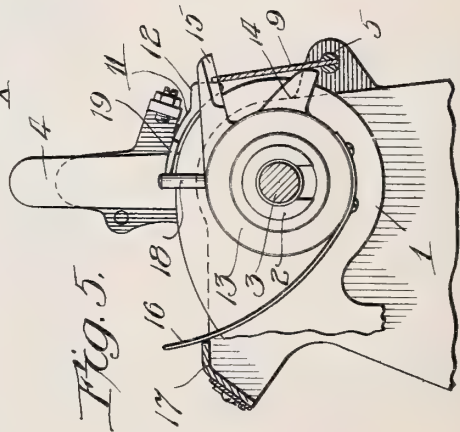


Fig. 5.

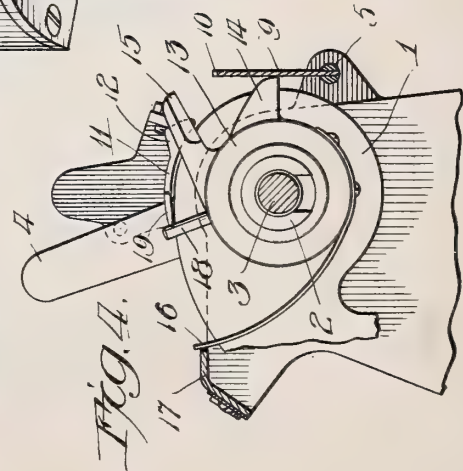


Fig. 4.

Witness
Harry S. Gaither

Inventor:
J. C. Mott.
By Chamberlin & Freudenreich
Attys

S. C. NOTT.
 AUTOMATIC ALARM FOR DICTATING MACHINES.
 APPLICATION FILED DEC. 4, 1915.

1,206,462.

Patented Nov. 28, 1916.
 4 SHEETS—SHEET 3.

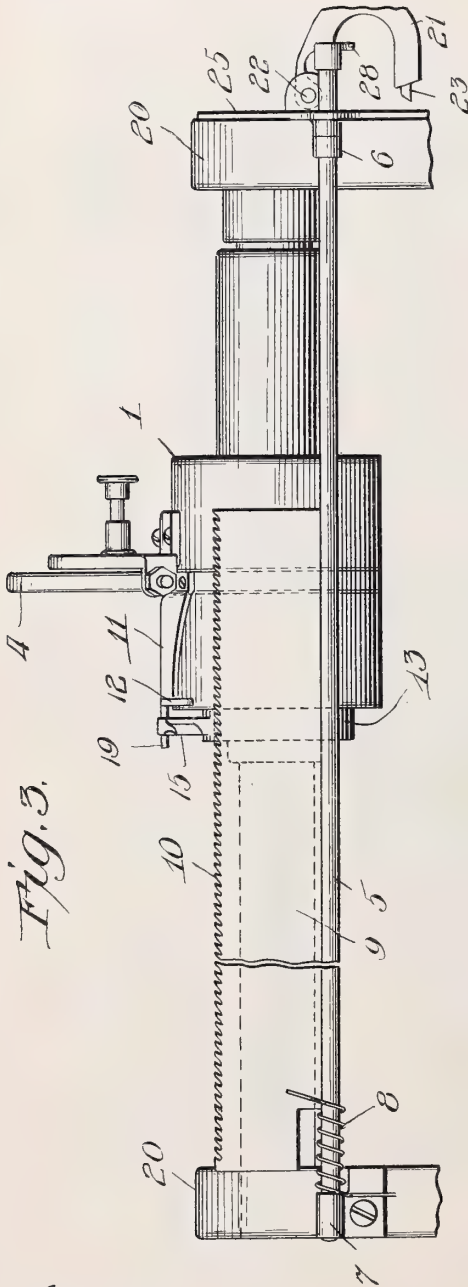


Fig. 3.

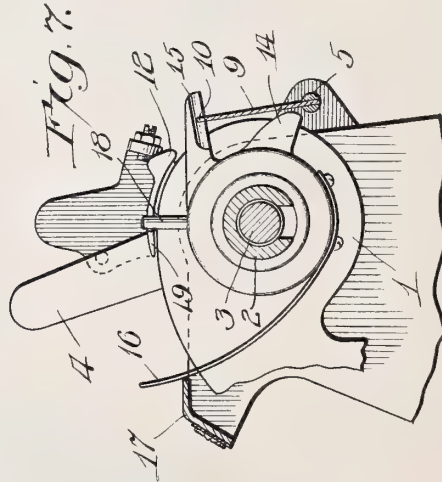


Fig. 7.

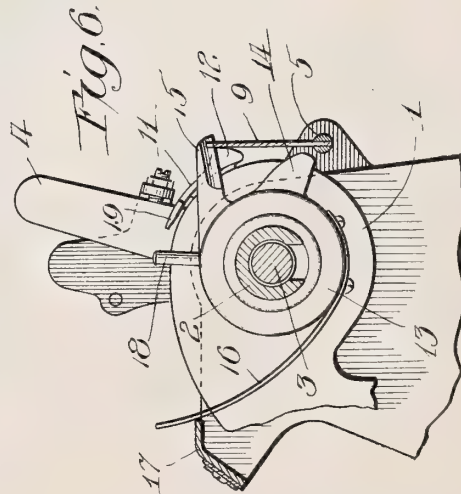


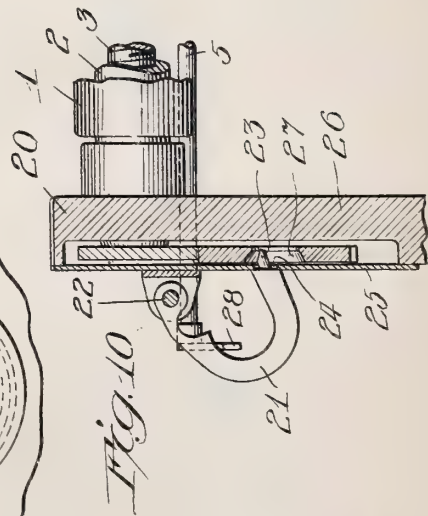
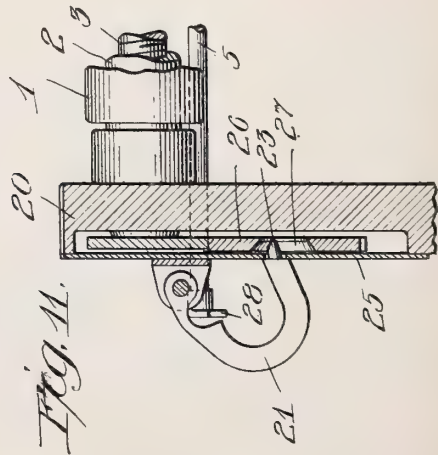
Fig. 6.

Witness
Harry S. Gaither

Inventor:
S. C. Nott,
 by *Chamberlin & Henderson*
Attys

1,206,462.

4 SHEETS—SHEET 4.



Inventor:
J. C. Mott,
Chamberlain & Breidenreich
Attys

UNITED STATES PATENT OFFICE.

SYDNEY C. NOTT, OF LA GRANGE, ILLINOIS.

AUTOMATIC ALARM FOR DICTATING-MACHINES.

1,206,462.

Specification of Letters Patent.

Patented Nov. 28, 1916.

Application filed December 4, 1915. Serial No. 64,988.

To all whom it may concern:

Be it known that I, SYDNEY C. NOTT, a citizen of the United States, residing at La Grange, county of Cook, State of Illinois, have invented a certain new and useful Improvement in Automatic Alarms for Dictating-Machines, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

Dictating machines, that is machines for recording dictation on a cylinder of wax or other material for subsequent transcription, are so arranged that the user may stop his dictation and, going back, reproduce for himself any portion of the matter already dictated. It often happens that the operator's attention is distracted from the machine so that his manipulation thereof is purely mechanical and he therefore begins to dictate when the machine is not set properly. Thus it may happen that after a manipulation of the machine by which previously dictated matter was repeated, the operator forgets to shift the machine from a reproducing position to a dictating position and finds, after having dictated into the machine, that no record has been made. Again, intending to have repeated to him matter previously dictated, the operator, after moving the carriage back, sets the machine in the dictating position instead of the reproducing position. The result is of course that the record previously made is obliterated or damaged. It is also evident that if the machine is set in the reproducing position while the operator is dictating or is set in the dictating position while the operator is attempting to reproduce, much of the value of a dictating machine may be lost because it wastes the time of the operator, tries his patience, and breaks up his train of thought by leaving out something or obliterating something which he may perhaps not later be able to recall in just the way that he dictated it.

The object of the present invention is to provide means for overcoming the aforesaid faults of dictating machines arising from wrong operation thereof.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of my invention and of its object and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawing, wherein:

Figure 1 is a top plan view of the upper part of a dictating machine arranged in accordance with my invention, the parts being illustrated in a dictating position under conditions improper for the recording of dictation; Fig. 2 is a top plan view of the parts shown in Fig. 1 in normal dictating position; Fig. 3 is a rear view of the upper part of the machine, with the parts in the same positions as in Fig. 2; Fig. 4 is a section taken approximately on line X—X of Fig. 2, the parts being in the same positions as in Fig. 2; Fig. 5 is a view similar to Fig. 4 with the controlling lever in the neutral position; Fig. 6 is a view similar to Figs. 4 and 5, the controlling lever being in the reproducing position; Fig. 7 is a view similar to Figs. 4 to 6, the parts being in the positions indicated in Fig. 1; Fig. 8 is an end view, looking toward the right at the left hand end of Fig. 2; Fig. 9 is a section taken approximately on line Y—Y of Fig. 8, the parts being in the positions occupied when the machine is properly set for dictation; Fig. 10 is a view similar to Fig. 9, the parts being in the positions which they occupy under the conditions illustrated in Figs. 1 and 7, and also when the controlling lever is in the neutral position; and Fig. 11 is a view similar to Figs. 9 and 10, the parts occupying the positions which they assume when the carriage, in the reproducing position, reaches the end of the dictation.

I have illustrated my invention as embodied in a mechanism which produces an alarm although it will of course be understood that the ultimate function of the

mechanism is to prevent wrong operation of the machine regardless of whether this is done by sounding an alarm or otherwise, and I have illustrated my mechanism as adapted for and applied to that type of machine known as the Dictaphone although it will of course be understood that my invention is not confined to any particular type of dictating machine. I have confined the illustration of my invention to a single embodiment for the sake of brevity and clearness and, for the same reason, I shall confine the detailed description to this single embodiment.

Referring to the drawings, 1 represents the carriage of the machine, movable along a stationary tubular support or shaft, 2, within which is arranged a suitable driving worm or shaft, 3, for the carriage. On the carriage is a lever, 4, having the three positions indicated in Figs. 4, 5 and 6: the first being the dictating position; the second being the neutral position in which the carriage is left free to be moved back and forth along its support; and the third being the reproducing position. By means of the lever the machine is adjusted into the three positions necessary in all machines of this general type and it is my purpose to utilize these three positions in conjunction with a position of the carriage along its support, to control the means by which improper operation of the machine is prevented. Machines of this general type are disclosed in Patents 527,755 of October 16, 1894, 569,290 of October 13, 1896 and 874,973 of December 31, 1907.

In the arrangement illustrated I have provided at the back of the machine a rod, 5, mounted in suitable stationary bearings, 6 and 7, so as to lie parallel with the shaft 3 and be rotatable and at the same time movable lengthwise relatively to the stationary parts of the machine. A spring, 8, acting both as a compression spring and as a torsion spring, tends to hold the rod, 5, at one limit of its longitudinal movement and at one limit of its angular movement. Fixed to the rod, 5, is a blade or vane, 9, extending upwardly, and of a length at least equal to the distance through which the carriage may travel. On the upper edge of the member 9 are teeth, 10, preferably ratchet teeth. On the lever, 4, is a laterally projecting arm, 11, provided at the rear edge with a cam, 12. The parts are so proportioned that when the lever is in the reproducing position the cam, 12, presses the blade or vane, 9, outwardly against the tension of the spring, while in its other two positions it permits the blade or vane to be swung inwardly. On the guide, 2, in advance of the carriage, is a collar, 13, slidable and rotatable on the guide. The collar is provided with a cam, 14, which, in one angular position of the collar, bears against the blade or vane, 9, and presses it outwardly in the same way that this is done by the cam on the lever when the latter is in its reproducing position. The collar is also provided with a tooth or pawl, 15, above the cam, 14, and in position to drop down into engagement with the teeth 10 in a second angular position of the collar. Suitable means are provided which tend yieldingly to hold the collar in such angular position that the tooth, 15, engages with the teeth on the vane or blade. In the arrangement illustrated, this means consists of a leaf spring, 16, secured at one end to the periphery of the collar and extending upwardly past the scale bar, 17, at the front of the machine; the spring, 16, being initially under such tension that in tending to straighten itself it turns the collar in the clockwise direction as viewed in Figs. 4 to 7, throwing the cam, 14, down out of engagement with the blade or vane and bringing the tooth, 15, into engagement with the teeth 10. At the top of the collar is a radially projecting pin, 18. On the arm, 11, which is carried by the controlling lever, is a finger, 19, which, under certain conditions, is adapted to be thrust behind the pin 18 and, upon operation of the lever 4, turn the collar against the tension of the spring 16 so as to lift the tooth, 15, clear of the ratchet teeth. The parts are so proportioned that when the collar and the carriage are brought together while the lever is in either the neutral or the reproducing position, the finger, 19, moves into operative relation to the pin 18 so that upon swinging the lever 4 to the dictating position the collar is turned in the direction to carry the teeth or pawl, 15, away from and bring the cam, 14, into engagement with the vane or blade. It will thus be seen that when the collar lies beside the carriage with the pin, 18, in front of the finger, 19, and the lever, 4, in the dictating position, the vane or blade is swung back to the rearward limit of its movement as shown in Fig. 4. A similar situation is produced whenever the lever, 4, is in its reproducing position as indicated in Fig. 6. On the other hand, whenever the lever 4 is in its neutral position as shown in Fig. 5, regardless of whether or not the collar and the carriage are in proximity to each other, and whenever the lever 4 is in the dictating position without having the carriage and the collar lying close together, with the finger, 19, behind the pin 18, as indicated in Fig. 7, the blade or vane lies at the forward limit of its turning movement. Furthermore, when the lever 4 is in the reproducing position as shown in Fig. 6, as when the operator has set the carriage back to repeat what he has previously dictated, and the machine is run

until the carriage reaches the end of the dictated matter, the carriage strikes the collar and moves it along the guide or support and, through the engagement of the tooth, 15, with the vane or blade, causes the vane or blade to be shifted in the direction of its length. In other words, whenever the machine is set for a normal operation and is operating normally, the blade or vane is back in what may be called its normal position while at other times, when the machine is improperly set for normal operation or is being wrongly operated, the vane is in what may be termed an abnormal position; it being understood that for normal operation the collar is placed just beside the carriage when the carriage is at the starting point, the finger, 19, being behind the pin 18 so that when the lever is moved to the dictating position it rotates the collar against the tension of its spring, and the collar being simply forced along the guide ahead of the carriage as the dictation proceeds and remaining at whatever point it may be when the carriage is temporarily shifted back for the purpose of repeating matter previously dictated. I therefore employ the blade or vane as a controller for a suitable alarm signal or other means for preventing improper operation.

In the arrangement illustrated, I have mounted on the end of the frame, 20, of the machine a U-shaped dog, 21, hinged at one end as at 22 so as to be capable of swinging about an axis at right angles to the rod, 5. On the free end of the dog is a pin, 23. The pin, 23, is adapted to swing into and out of an opening, 24, in a face plate, 25, forming with other parts of the frame a housing for the gear train, 26, between the shaft on which the record cylinder is mounted and the screw shaft, 3, by means of which the carriage is driven. One member of the gear train, 26, is provided with one or more openings, 27, adapted, as the train operates, to pass in front of the opening 24, in the face plate. The walls of the opening or openings, 27, or the end of the pin, 23, or both, may be beveled so that when the dog hangs in a position in which the pin projects through the hole, 24, and the machine is operated, the dog is oscillated, the end or shoulder at the base of the pin striking against the face plate whenever the holes 27 or one of them comes opposite the hole 24 and thus producing a series of clicking sounds while the machine continues to operate. The end of the rod, 5, is continued beyond the end of the machine at which the dog is located, and it is there provided with a projecting arm, 28, which projects forwardly between the arms of the dog.

When the vane or blade is in its normal position, as heretofore explained, the arm,

28, is in the position indicated in Fig. 9, the upper member of the dog resting upon the arm and the dog being held in an idle position; this position indicating normal operating conditions. When the vane or blade is allowed to assume the first of its abnormal positions, indicating an abnormal operating condition, the arm, 28, assumes the position illustrated in Fig. 10, allowing the dog to swing down with the pin, 23, projecting through the opening, 24. If now the machine is set in operation the clicking signal will be given. If the controlling vane or blade is shifted to its second abnormal position, by being shifted lengthwise against the tension of its spring, the parts assume the positions indicated in Fig. 11; the dog being allowed to drop into a signaling position by a lateral instead of a rotary movement of the arm.

The conditions indicated in Fig. 10 are brought about, as heretofore explained, and therefore the alarm will be sounded: when it is attempted to operate the machine with the lever in its neutral position; when the operator happens to place the lever in the dictating position with the carriage shifted back from the point of farthest advance; and when the operator starts at the beginning of a new cylinder without bringing the collar or marker for the point of farthest advance of the carriage back to the starting point. The conditions indicated in Fig. 11 are brought about and therefore the alarm will be sounded if the operator, after setting the carriage back to reproduce previously dictated matter, fails to shift the controlling lever into the dictating position when he reaches the point where the previous dictation stopped, and attempts to continue his dictation under conditions which would fail to leave a record on the cylinder.

It will thus be seen that by means of my device, without any other effort on the part of the operator than that required to shift the collar manually from one end of the guide to the other whenever he removes a cylinder and replaces it with a new one, he may be certain that the machine is always operating properly when it is operating at all and that his record cylinder will not contain blank or damaged areas where it should contain a clear record.

As I have heretofore explained, my invention is not confined to a signal or alarm but may take any form which will in any manner prevent improper operation, and I therefore use the term warning device in this broad sense. Furthermore, while the collar illustrated is probably the most practical device for performing its functions, it will of course be understood that any other kind of farthest-advance marking device may be employed.

I claim:

1. In a dictating machine, traveling mechanism having a dictating position and other positions, a farthest-advance marker, a warning device, and means for causing said device to act when it is attempted to carry the said mechanism in any other position than the dictating position past the point corresponding to the position of the marker.
2. In a dictating machine, mechanism for recording and reproducing dictation having a neutral position and working positions, a warning device, and means causing said device to act when the machine is operated while said mechanism is in the neutral position.
3. In a dictating machine, traveling mechanism having a dictating position and a reproducing position; a farthest advance marker, a warning device; and means for causing said device to act when it is attempted to advance the said mechanism, while in the dictating position, from a point remote from that corresponding to the position of the marker.
4. In a dictating machine, a traveling dictating and reproducing mechanism having a dictating position and a second position, a farthest-advance marker, and means for causing a continuing warning to be made when said mechanism while occupying said second position reaches the point indicated by said farthest-advance marker.
5. In a dictating machine, traveling mechanism for recording and reproducing dictation having a plurality of positions, a farthest-advance marker for said mechanism, and means controlled jointly by said marker and said mechanism for causing a warning to be given when said mechanism approaches the point indicated by said marker while occupying one of its said positions and for permitting it to pass said point without causing a warning while occupying another of said positions.
6. In a dictating machine, the combination with a part having a dictating position and a reproducing position, of a warning device, a farthest-advance marker, and means governed by the position of said part and also by said marker for controlling said device.
7. In a dictating machine, mechanism for recording and reproducing dictation having a neutral position and working positions, a warning device, and means associated with said mechanism for acting on said device and causing it to give a warning when the machine is operated with said mechanism in the neutral position.
8. In a dictating machine; traveling mechanism for recording and reproducing dictation having a plurality of working positions and adapted to be moved while in any one of said working positions; and warning mechanism including a part adapted to be moved in one direction, only, by said mechanism.
9. In a dictating machine, traveling dictating and reproducing mechanism, and warning means including a part adapted to be pushed ahead of said mechanism and to remain stationary when said mechanism is moved backward.
10. In a dictating machine, mechanism for recording and reproducing dictation having neutral and working positions, a warning device, and means for causing said device to act when the machine is operated while said mechanism is in the neutral position.
11. In a dictating machine, the combination with a part having a neutral position and a reproducing position, of a warning device, a farthest-advance marker, and means controlled by said part and also by said marker for causing said warning device to sound a warning when the machine is operated while in the neutral position.
12. In a dictating machine, the combination with a part having a neutral position and a dictating position, of a warning device, a farthest-advance marker, and means controlled by said part and also by said marker for causing said warning device to sound a warning when the machine is operated while in the neutral position.
13. In a dictating machine, traveling dictating and reproducing mechanism, and warning means including a part adapted to be moved by said mechanism when the latter travels in one direction and remain stationary when said mechanism travels in the other direction.
14. In a dictating machine, traveling dictating and reproducing mechanism, and warning means including a part adapted to be engaged by said mechanism and be caused to travel therewith when said mechanism moves in one direction and remain stationary when said mechanism is moved in the opposite direction.
15. In a dictating machine, traveling dictating and reproducing mechanism, actuating means therefor, a signal operated by said actuating means, and means controlled by said mechanism for permitting the signal to be operated when it is attempted to cause said mechanism to travel ahead while in a neutral position and also when it is attempted to cause such mechanism to move in a reproducing position past the end of previously dictated matter.
16. In a dictating machine, mechanism for recording and reproducing dictation having a neutral and a working position, and means for sounding a continuing alarm

when the machine is operated with said mechanism in the neutral position.

17. In a dictating machine, traveling dictating and reproducing mechanism having a dictating position and a reproducing position, a device for indicating the farthest point to which said mechanism has advanced during dictation, and means controlled by

said device for producing a continuing warning when said mechanism reaches the aforesaid point while in the reproducing position. 10

In testimony whereof, I sign this specification.

SYDNEY C. NOTT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

SOUND BOX FOR TALKING MACHINES,
#1,206,635-----C.E.Woods,
Patented-November 28th, 1916.
Filed-January 21st, 1915.

C. E. WOODS.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED JAN. 21, 1915.

1,206,635.

Patented Nov. 28, 1916.

Fig. 1

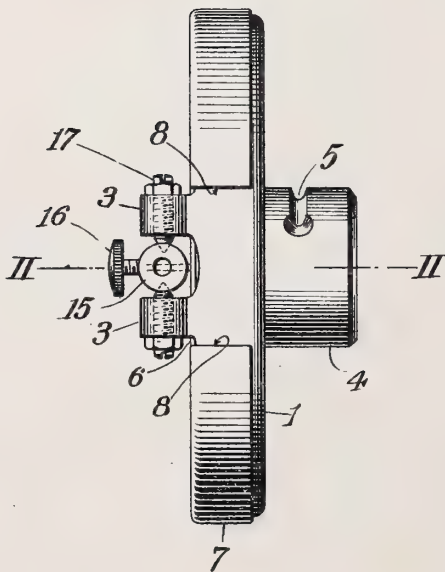


Fig. 2

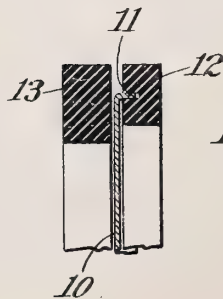
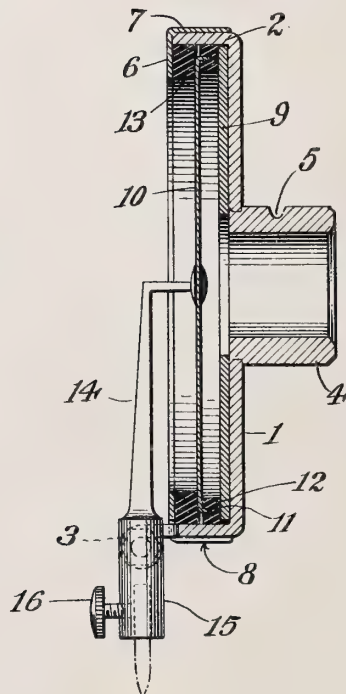


Fig. 3

Witnesses:
J. B. Wegmanst.
Sidney S. Stubble.

Inventor
Clinton E. Woods.
By his Attorneys
Mauro, Cameron, Lewis & Massie.

UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

SOUND-BOX FOR TALKING-MACHINES.

1,206,635.

Specification of Letters Patent.

Patented Nov. 28, 1916.

Application filed January 21, 1915. Serial No. 3,524.

To all whom it may concern:

Be it known that I, CLINTON E. WOODS, a citizen of the United States, and a resident of Bridgeport, Fairfield county, Connecticut, have invented a new and useful Improvement in Sound-Boxes for Talking-Machines, which invention is fully set forth in the following specification.

This invention relates to sound-boxes, and more particularly to sound-boxes designed to reproduce sounds from sound-records having thereon a record groove with lateral or zig-zag undulations. But the invention is capable of being embodied in sound-boxes employed in connection with other types of record grooves.

The object of the invention is to diminish the cost of manufacture of such sound boxes, while improving the acoustic qualities of the reproductions obtained thereby.

With this object in view, the invention consists, generally speaking, in forming the sound-box casing of sheet metal or the like stamped into proper form, and preferably placing a disk of heavy, non-resonant material, such as lead, in the interior of the sound-box, for the purpose of affording the desirable weight to the sound-box and improving the quality of the acoustic reproductions obtained thereby.

Other features of the invention consist in the various details of construction and arrangement of parts hereinafter set forth and claimed.

The inventive idea involved is capable of receiving a variety of mechanical expressions, one of which, for the sake of illustrating the invention, is shown in the accompanying drawings, but it is to be expressly understood that such drawings are for the purposes of illustration only, and not as defining the limits of the invention, reference being had to the appended claims for that purpose.

In said drawings,—Figure 1 is an edge view illustrating one embodiment of the invention; Fig. 2 is a transverse section taken on the line II—II of Fig. 1; and Fig. 3 is a sectional view, on an enlarged scale, of a detail.

Referring to the drawings, in which like reference numerals indicate like parts throughout the several views, 1 is the rear portion of the casing struck up or pressed from sheet metal, and is provided with a

peripheral flange 2, from which latter extend two ears 3, 3, integral with the flange, and whose extremities are bent to form annuli (shown in dotted lines in Fig. 2), which carry the bearings for the stylus bar. The neck 4 of the sound-box is of the usual form, and is inserted in a circular opening in the rear casing 2, and provided with the usual bayonet-joint groove 5 for securing the sound-box to the usual or any suitable conveyer or tone-arm. The front casing is also struck up from sheet metal, and consists of a flat annulus 6 provided with a peripheral flange 7, which flange is of such internal diameter as to fit snugly over the flange 2 of the rear casing, so that when the two are pressed together they constitute the complete sound-box casing, and are secured together entirely by friction. The peripheral flange 7 is cut away between the points 8, 8, as indicated in Fig. 1, to provide space for the ears 3, 3, and if desired, a portion of the annulus 6 may also be cut away for this purpose.

Preferably, and especially when the casing is formed of sheet metal (which is comparatively light), a centrally apertured disk 9 of heavy, non-resonant material, such as lead, is located within the sound-box adjacent the inner face of the back of the rear casing 1, preferably with its two faces parallel respectively to said inner face and to the diaphragm. Any suitable diaphragm may be employed, but preferably one formed of thin sheet metal having a narrow upturned flange 11 (shown in large detail in Fig. 3) is used. A gasket of suitable sound-insulating material, as rubber or cork, in the form of a ring 12, is placed adjacent the disk 9. This gasket may either be provided with an annular groove in which the flange of the diaphragm is received, or the flange may be forced into the material of the gasket when assembling the parts. A second annular gasket 13 of suitable sound-insulating material, as rubber or cork, is placed above the diaphragm, and preferably one of these gaskets (here shown as the gasket 13) is of less internal diameter than the other, though if desired, the gaskets may be of the same internal diameter.

The stylus bar 14 has a reduced inner end secured to the center of the diaphragm in any approved manner, the outer end of the stylus bar being provided with an enlarged

barrel 15 for receiving the stylus, which may be held in place by the usual set screw 16. Preferably, the stylus bar is mounted upon the points forming the inner ends of screws 5 17 screw-threaded into the annuli formed by the ears 3, 3. The conical points of the screws 17 enter corresponding bearing sockets on opposite sides of the stylus bar, and the screws may either be so adjusted to 10 permit the stylus bar to turn freely upon the points with little or no friction, or, preferably, may be screwed down so firmly as to rigidly hold the stylus bar and prevent any appreciable turning, suitable jam nuts 15 being provided to hold the screws in their adjusted position.

The several parts of the sound-box as thus described are all capable of being standardized, produced in quantities, and as stock 20 articles of product may then be readily assembled into the complete sound-box, without the employment of skilled labor.

In assembling the parts, the non-resonant disk 9 is first inserted within the rear casing; the inner gasket 12 is then placed in position; and the diaphragm, with the inner end of the stylus bar secured thereto, is placed thereon, after which the gasket 13 is placed in position over the diaphragm, and 30 the front casing, with the space between the ends 8, 8, opposite the ears 3, 3, is then forced over the outer casing under more or less pressure, until the edge of flange 2 abuts against the inner face of the annulus 6. 35 Finally, the two pointed screws 17 are introduced into their respective bearing ears 3, 3, and turned down until their points properly engage the seats formed in the side of the barrel 15 on the stylus bar.

40 Not only is this sound-box inexpensive to construct and easy to assemble, but it has been found to give acoustic results comparing favorably with those of far more expensive construction. The disk 9 being of 45 heavy, non-resonant material, serves not only to supply the requisite weight to the structure as a whole, but would appear to contribute materially to the superior acoustic properties of the reproducer, which has been 50 found to be comparatively free from sound vibrations other than those imparted to the diaphragm by the undulations of the record.

The invention has been described with considerable detail, but only for the sake of 55 clearness, and it is to be expressly understood that the invention is not limited to the precise construction, arrangement and materials set forth, but is susceptible of a variety of embodiments. Furthermore, parts 60 of the invention can be used to the exclusion of other parts, and certain of the parts can be transposed, without departing from the spirit of the invention defined.

What is claimed is:

55 1. In a sound-box for talking-machines, a

casing comprising a front and a rear portion, marginal flanges on said portions fitted tightly one over the other, a diaphragm within said casing, gaskets fitted within said casing around the periphery of said diaphragm, and a centrally-apertured weight 70 of non-resonant material such as lead in the form of a disk of uniform thickness located within the rear portion of said casing.

2. In a sound-box for talking-machines, 75 a two-part casing of sheet metal or the like held together by friction, a non-resonant metallic disk and a diaphragm within said casing, an annular gasket between said disk and diaphragm, and a stylus bar mounted 80 on said casing and secured at one end to said diaphragm.

3. In a sound-box for talking-machines, a diaphragm, annular gaskets on either side of said diaphragm, a metallic disk of non-resonant material adjacent one of said 85 gaskets, and a two-part casing held together by friction and providing a chamber for securely inclosing the whole.

4. A sound-box for talking-machines, 90 comprising a front casing and a rear casing fitted tightly one into the other to provide a chamber, annular gaskets within said chamber, a diaphragm between said gaskets, a non-resonant disk of substantially uniform thickness and of heavy material such 95 as lead between one of said gaskets and one wall of said chamber, a stylus-bar connected to said diaphragm, and portions integral with said rear casing and extending forwardly beyond said front-casing to support 100 said stylus-bar.

5. In a sound-box for talking-machines, a casing of sheet-metal or the like forming a diaphragm-chamber, a diaphragm in said 105 chamber, a non-resonant disk of lead or the like between said diaphragm and one wall of said casing, a stylus-bar attached at one end to the center of said diaphragm, and supports integral with said casing and on 110 which said stylus-bar is fulcrumed.

6. In a sound-box for talking-machines, a diaphragm, a stylus-bar, an annular gasket on each side of said diaphragm, a 115 metallic non-resonant disk adjacent one of said gaskets, a two-part casing of sheet-metal or the like held together by friction and constituting a chamber for said diaphragm and disk and gaskets, and bearings 120 on the casing for said stylus-bar.

7. A sound-box for talking-machines, comprising a front casing and a rear casing fitted tightly one into the other to provide a chamber, annular gaskets within said 125 chamber, a diaphragm between said gaskets, and a disk of non-resonant metal between one of said gaskets and the rear wall of said chamber.

8. In a sound-box for talking-machines, a casing of sheet-metal or the like forming a 130

diaphragm-chamber, a diaphragm in said chamber, and a disk of non-resonant metal such as lead between said diaphragm and the rear wall of said casing.

5 9. In a sound-box for talking-machines, a diaphragm, a stylus-bar, an annular gasket on each side of said diaphragm, a metallic non-resonant disk adjacent one of said gaskets, and a two-part casing of sheet-metal or the like held together by friction and constituting a chamber for said diaphragm.

10 10. In a sound-box for talking-machines, a rear casing open at the front, two gaskets and an interposed diaphragm fitted therein, a centrally-apertured disk of lead or the like between one gasket and the wall of said rear casing, and a front casing having a marginal rear flange held frictionally upon said rear casing.

11. In a sound-box for talking-machines, a rear casing open at the front, two gaskets and an interposed diaphragm fitted therein, a non-resonant disk of heavy material such

as lead adjacent one of said gaskets, and a front casing having a marginal rear flange held frictionally upon said rear casing. 25

12. In a sound-box for talking-machines, a casing forming a chamber having a non-resonant metallic sound reflecting surface, a diaphragm mounted between gaskets in said casing, and a stylus bar mounted on said casing and connected to said diaphragm. 30

13. In a sound-box for talking-machines, a casing forming a chamber, a diaphragm suitably held in said chamber, and a weight of non-resonant material such as lead located within said chamber at the rear of said diaphragm. 35

In testimony whereof I have signed this specification in the presence of two subscribing witnesses. 40

CLINTON E. WOODS.

Witnesses:

LAURETTA T. NEAL,
FRANK C. HINCKLEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

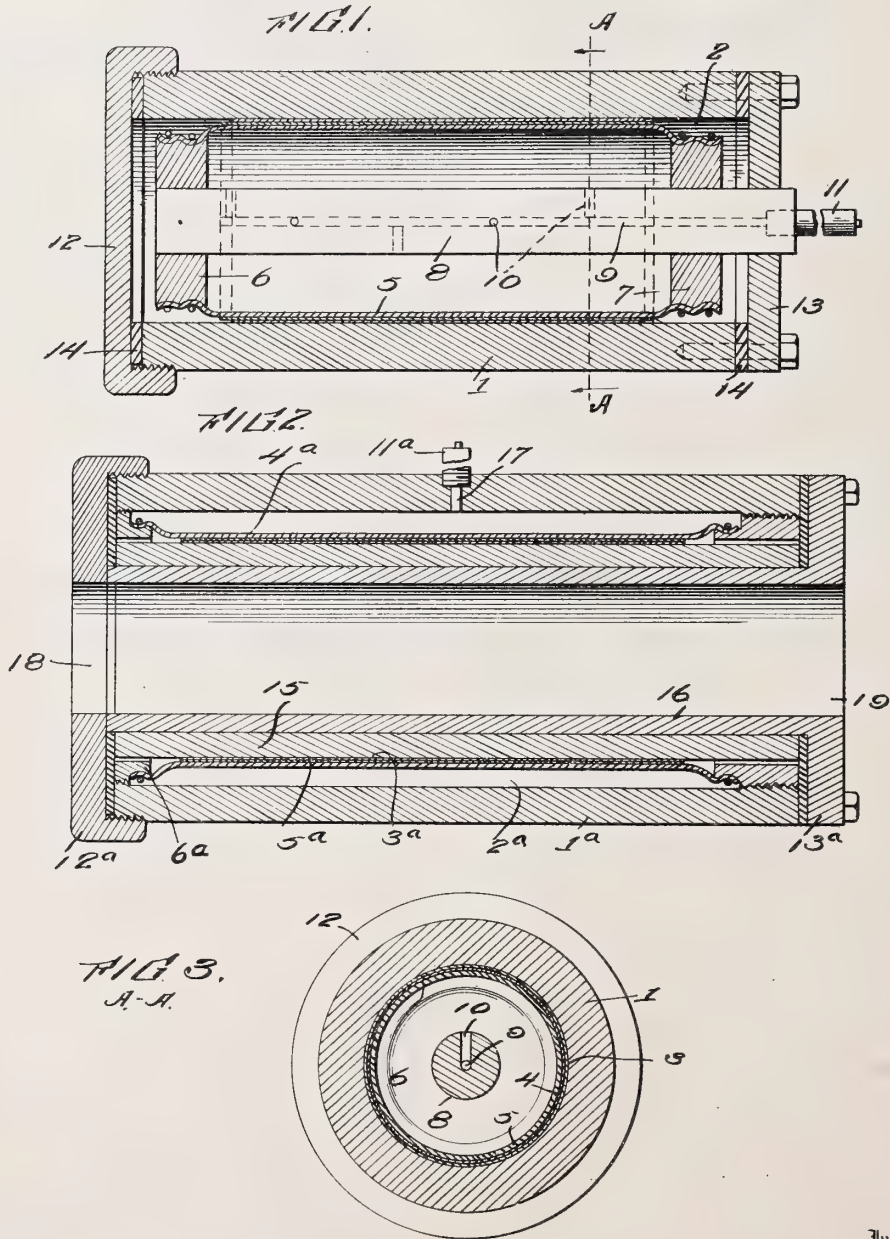
PROCESS OF PRODUCING PHONOGRAPH
RECORDS,

#1,206,684-----T. ~~Eynon~~,
Patented-November 28th, 1916.
Filed-August 25th, 1915.

T. EYNON.
PROCESS OF PRODUCING PHOTOGRAPHIC RECORDS.
APPLICATION FILED AUG. 25, 1915.

1,206,684.

Patented Nov. 28, 1916.
2 SHEETS—SHEET 1.



Witnesses
R. H. Trognor
H. Abrams.

Inventor
Thomas Eynon
By Mason Fennick Lawrence,
Attorneys

T. EYNON.
 PROCESS OF PRODUCING PHOTOGRAPHIC RECORDS.
 APPLICATION FILED AUG. 25, 1915.

1,206,684.

Patented Nov. 28, 1916.
 2 SHEETS—SHEET 2.

FIG. 7.

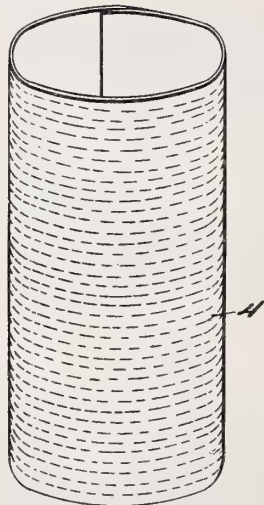


FIG. 9.

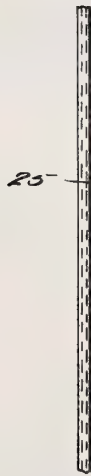


FIG. 8.

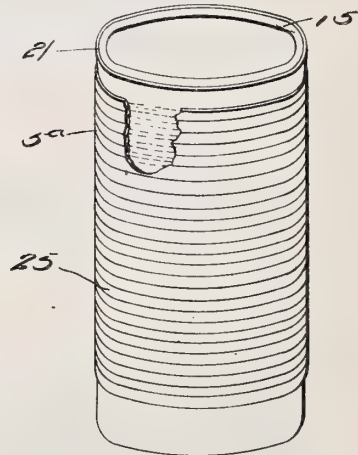


FIG. 4.

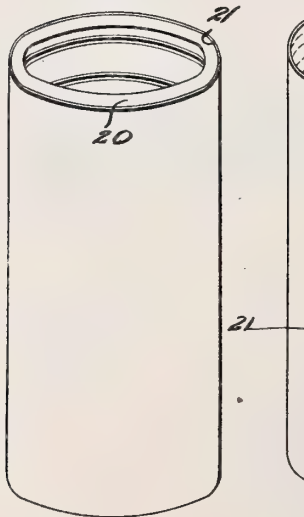


FIG. 5.

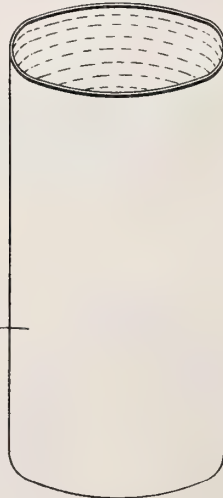


FIG. 6.



Inventor

Witnesses

R. F. Crognier,
Ed. Ahams.

Thomas Eynon
 by *Wm. Fennick Lawrence,*
 Attorneys

UNITED STATES PATENT OFFICE.

THOMAS EYNON, OF CHICAGO, ILLINOIS, ASSIGNOR TO RIBBON RECORD COMPANY, A CORPORATION OF ILLINOIS.

PROCESS OF PRODUCING PHONOGRAPHIC RECORDS.

1,206,684.

Specification of Letters Patent.

Patented Nov. 28, 1916.

Original application filed November 11, 1911, Serial No. 659,745. Divided and this application filed August 25, 1915. Serial No. 47,298.

To all whom it may concern:

Be it known that I, THOMAS EYNON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Processes of Producing Phonographic Records; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to phonographic records, and has for an object to provide a new and improved record of ribbon type with a new and improved method of manufacturing such improved record.

This application is a division of my application Serial No. 659,745, filed November 11, 1911, patented October 26, 1915, No. 1,158,377.

The main objects of this invention are to provide an improved method of making flexible phonographic records; to provide an improved method of reproducing flexible records from an initial plastic record; to provide an improved method of obtaining a record blank; to provide an improved method of securing the matrix and record blank in position for reproducing the phonographic impression; to provide an improved method of reproducing the phonographic impression of the matrix upon the record blank; to provide improved apparatus for making flexible records either in cylindrical or strip form; to provide an improved form of record blank which is inexpensive, flexible, and adapted to be packed in compact form for shipment and storage; to provide an improved record having multiple impressions formed thereon in substantially parallel relation, each impression being the reproduction of individual vocal or instrumental parts adapted to be rendered in concert; and to provide an improved method of obtaining the simultaneous and harmonious reproduction of the several impressions.

The accompanying drawings illustrate diagrammatically the various steps of the

process, also suitable mechanism for carrying out this invention and the resulting product.

Figure 1 is a sectional elevation of an apparatus for transferring the impression to the outer surface of a record blank. Fig. 2 illustrates an apparatus for transferring the impression to the interior surface of a record blank. Fig. 3 is a transverse sectional view taken on line A—A of Fig. 1. Fig. 4 is a perspective view of an electroplated plastic record. Fig. 5 is a perspective view of the electro-plate removed from the plastic record. Fig. 6 is a perspective view of a mandrel upon which the paper record blank is formed, a blank being shown in position thereon. Fig. 7 is a perspective view of the paper record. Fig. 8 is a perspective view of a matrix record showing a record blank in position thereon, as made up from a strip of paper. Fig. 9 is a fragmentary face view of the strip removed from the matrix after the impression has been taken.

In the apparatus shown in Fig. 1 of the drawings, as designed to carry out this invention, a member 1, preferably in the form of a cylinder, has a cylindrical bore 2, which is adapted to receive the matrix record 3, the exterior diameter of the matrix being substantially equal to the diameter of the bore 2, so as to snugly fit therein and prevent the matrix from becoming distorted when pressure is exerted against it. The pneumatic means whereby pressure is obtained for reproducing the impression of the matrix record upon the record blank 4 comprises a flexible diaphragm in the form of a rubber cylinder 5, firmly secured at its ends to disks 6 and 7, carried on the rod 8. The rod 8 has a longitudinal bore 9 extending inward from one end and communicating with the interior of the rubber cylinder 5 by means of a plurality of transverse apertures 10. The outer end of the rod 8 is provided with a pneumatic valve 11 of the usual construction, which permits the injection of air into the rubber casing 5, but prevents its escape unless manually operated. The cylinder 1 is provided with

a cap 12 screwed on to one end, and a cap 13 bolted to the opposite end. Gaskets 14, preferably of rubber, are interposed between the caps 12 and 13 and the ends of the cylinder 1.

The apparatus shown in Fig. 2 is adapted for use when the matrix record 3^A has an impression formed on the exterior surface, whereupon the impression is reproduced upon the interior surface of the record blank 4^A. In this apparatus, the matrix record 3^A is secured upon a cylinder 15, which is inserted into the casing 1^A and is supported upon a mandrel member 16, rigidly carried by the cap 13^A. The pneumatic means comprises a flexible diaphragm in the form of a rubber casing or cylinder 5^A secured upon rings 6^A, which may be suitably secured to the casing 1^A within the bore 2^A, as by means of a threaded connection. The annular space between the rubber casing 5^A and the cylinder 1^A then becomes the pneumatic chamber, and communication thereto is had by means of the aperture 17 controlled by the pneumatic valve 11^A. In this construction, the caps 12^A and 13^A are provided with apertures 18 and 19, the purpose of which will be hereinafter explained.

My improved process primarily consists in forming a matrix record from the initial impression upon a plastic record, making a record blank, and reproducing the impression on the matrix record upon the record blank by means of apparatus just described. In describing the various steps of my process, I will first describe such steps as they are to be performed when the records are to be made with the apparatus as shown in Fig. 1, and then describe the steps that are taken when the records are to be reproduced with the apparatus shown in Fig. 2.

In either instance, the initial phonographic impression is made upon the usual plastic cylinder 20. If the record is to have several separate and individual impressions formed thereon to be simultaneously reproduced in concert, to constitute a harmonious whole, each instrumental or vocal part is separately and successively recorded upon the record in successive convolutions simultaneously during the rendition of all the parts in concert. For instance, in a vocal solo with piano accompaniment, the solo is recorded independently of the accompaniment while the piano is accompanying the singing as under the usual conditions, and then the solo and accompaniment are repeated while the piano accompaniment is reproduced upon the record blank independently of the solo, the impressions on the record being engraved adjacent and in parallel relation to the impression engraved for the solo. The record is then electro-plated with a metal deposit 21, preferably of copper.

If the electro-plate 21, which constitutes the matrix record 3, is to be used for reproducing records with the apparatus shown in Fig. 1, the exterior surface is milled or filed so that its diameter is exactly equal to the diameter of the bore 2, after which the electro-plate 21 and cylinder 20 are separated.

After the electro-plate 21 and the cylinder 20 have been separated, the electro-plate or matrix record 3 is placed in the casing 1 in preparation for reproducing the phonographic impression thereon upon a record blank.

If a cylindrical record is to be made, the record blank comprises a piece of flexible material 22, such as a sheet of paper, which is formed into a cylinder. This is most easily done by wrapping the sheet of paper 22 about a mandrel or form 23, so that the exterior diameter of the paper cylinder will be substantially equal to the interior diameter of the matrix record 3. The ends of the paper are slightly tapered so as to make a neat and substantially imperceptible a joint as possible where the two ends of the paper overlap. The outer surface of the paper cylinder is then coated with a plastic substance or composition, such as shellac, and allowed to dry. After the shellac has dried, the paper cylinder, which then constitutes the record blank 4, is placed within the matrix record 3, and a reproduction of the impression on the matrix is made upon the record blank. If one coating of shellac is found to be insufficient, a second or third coat may be applied after each coat has become dried.

If the electro-plate 21 is to be used for reproducing records with the apparatus shown in Fig. 2, after milling or filing to render it true, the electro-plate is removed from the plastic cylinder 20, which may be readily done by slitting the electro-plate longitudinally. The electro plate is then reversed and placed upon a cylinder 15 with the surface having the phonographic impression facing outwardly. The electro-plate is suitably secured to the cylinder 15, as by means of glue, and the convolutions of the impression accurately matched at the juncture of the slit. The cylinder 15, together with the electro-plate 21, then constitutes the matrix record 4^A. A record blank, comprising a cylinder of flexible material, such as paper having its interior surface coated with shellac and its interior diameter substantially equal to the exterior diameter of the matrix 4^A may be used for having the phonographic impression reproduced thereon.

If a record is to be made in the form of a strip, a strip of paper, substantially equal in width to the distance between the convolutions of the phonographic impressions on the matrix record 4 or 4^A is coated with a plastic substance, such as shellac, and allowed to dry. The strip is then placed

upon the embossed face of the matrix record by securing one end thereto, and spirally winding the strip upon the matrix record so that the middle of each convolution of the strip is directly over the respective phonographic impression, and then securing the other end of the strip. The matrix record and its record blank are then placed in one or the other of the apparatuses shown for making the impression on the matrix upon the strip. After the impression has been taken the strip is unfastened from the matrix and the record will then be in the form of a long strip. It is also possible to have the paper record 4 made into a strip by placing the record upon a mandrel and putting the mandrel in a lathe. The lathe may then be adjusted to give the proper movement to a cutting tool, so as to travel along and cut the record between the convolutions or sets of convolutions of the phonographic impression, whereupon the record becomes a strip similar to that shown in Fig. 9.

After the apparatus, as shown in either of the Figs. 1 and 2, is assembled with the matrix record, record blank and pneumatic means all in position, air is forced into the pneumatic chamber through the controlling valve, thereby causing the rubber diaphragm 5 or 5^A to expand and bear against the record blank, so as to create a uniform pressure over the entire surface of the record blank and cause the shellacked surface to have reproduced thereon the phonographic impression on the matrix record. In order to slightly soften the shellacked surface of the record blank, it is desirable to apply heat thereto, which may be conveniently done by placing the apparatus in a heated oven or by immersing the apparatus shown in Fig. 1 in hot water or by running the hot water through the mandrel 16, in the apparatus shown in Fig. 2, for which purpose the apertures 18 and 19 are provided in the ends 12^A and 13^A. The apparatus is then allowed to cool so that the shellacked surface again becomes hardened, whereupon the apparatus may be dismantled and the reproduced record removed.

The product is a simple and inexpensive record, not readily destroyed accidentally, and one which may be packed in compact form either for shipment or storage. When one of these records is to be played, it is placed upon a suitable holder capable of being connected with the phonograph, and the reproducing stylus is set to engage and trace the impression thereon. If the record bears multiple impressions, as hereinbefore explained, a plurality of reproducing styluses are properly set to respectively engage and trace the separate impressions so that all the impressions are simultaneously and harmoniously reproduced.

No attempt has been made to show all possible modifications of this invention, and it will be understood that numerous details may be altered or omitted without departing from the spirit of this invention, as defined by the following claims.

I claim:—

1. The process of reproducing flexible phonograph records which consists in providing a substantially rigid matrix having embossed thereon a matrix impression of a spiral record, placing a flexible record blank against said impression, and applying pressure to act against said record blank to cause the record to be embossed by the matrix upon said record blank, and then dividing said record blank along a spiral line between adjacent convolutions so as to form a flexible strip having the phonograph record running lengthwise thereon.

2. The process of reproducing flexible phonographic records which consists in forming the initial spiral phonographic impression on a cylindrical plastic record blank, making a substantially rigid matrix of the impression on said plastic record, separating the matrix and record, placing a flexible record blank against said matrix and applying pressure to cause the record to be embossed by said matrix upon said record blank, and then dividing said record blank along a spiral line extending along and between convolutions of the record so as to form a strip having the record reproduced thereon in a continuous line from one end of said strip to the other.

3. The process of reproducing phonographic records which consists in coating a flexible sheet of material with a plastic substance to form a record blank, bringing said blank in contact with a matrix record and applying pressure to cause the record to be embossed upon said blank, forming the latter into a cylinder, and then dividing it along a spiral line extending between convolutions of the record so as to form a strip having the record thereon in a continuous line from one end of said strip to the other.

4. The process of reproducing phonographic records which consists in coating a flexible cylinder with a plastic substance to form a record blank, bringing said record blank cylinder in contact with a matrix record and applying pressure to cause the record to be embossed upon said record cylinder, and then dividing the latter along a spiral line extending between convolutions of the record so as to form a strip having the record reproduced thereon in a continuous line from one end of said strip to the other.

5. The process of reproducing flexible phonographic records which consists in coating a flexible sheet of material with a plastic substance to form a record blank, plac-

ing said record blank in contact with a cylindrical matrix record and applying pressure to cause the record to be embossed by said matrix upon said record blank, and
5 then dividing said record blank along a spiral line extending along and between convolutions of the record so as to form a strip having the record reproduced thereon in a continuous line from one end of said strip
10 to the other.

6. The process of reproducing flexible phonographic records which consists in coating a flexible cylinder with a plastic substance to form a record blank, placing said
15 record blank in contact with a cylindrical matrix record and applying pressure to cause the record to be embossed by said matrix upon said record blank, and then dividing said record blank along a spiral line extending along and between convolutions of
20 the record so as to form a strip having the

record reproduced thereon in a continuous line from one end of said strip to the other.

7. The process of reproducing phonographic records which consists in providing
25 a substantially rigid cylindrical matrix having embossed thereon the impression of a spiral record, coating a flexible sheet of material with a plastic substance to form a record blank, shaping the latter into a cylinder, assembling said cylinders one within
30 the other with the plastic coating of the blank adjacent the record on the matrix, applying pressure to cause said record to be embossed on the blank, and then dividing
35 such blank along a spiral line extending between convolutions of the record so as to form a strip having the record thereon in a continuous line from one end of the strip to the other.

In testimony whereof I affix my signature.
THOMAS EYNON.

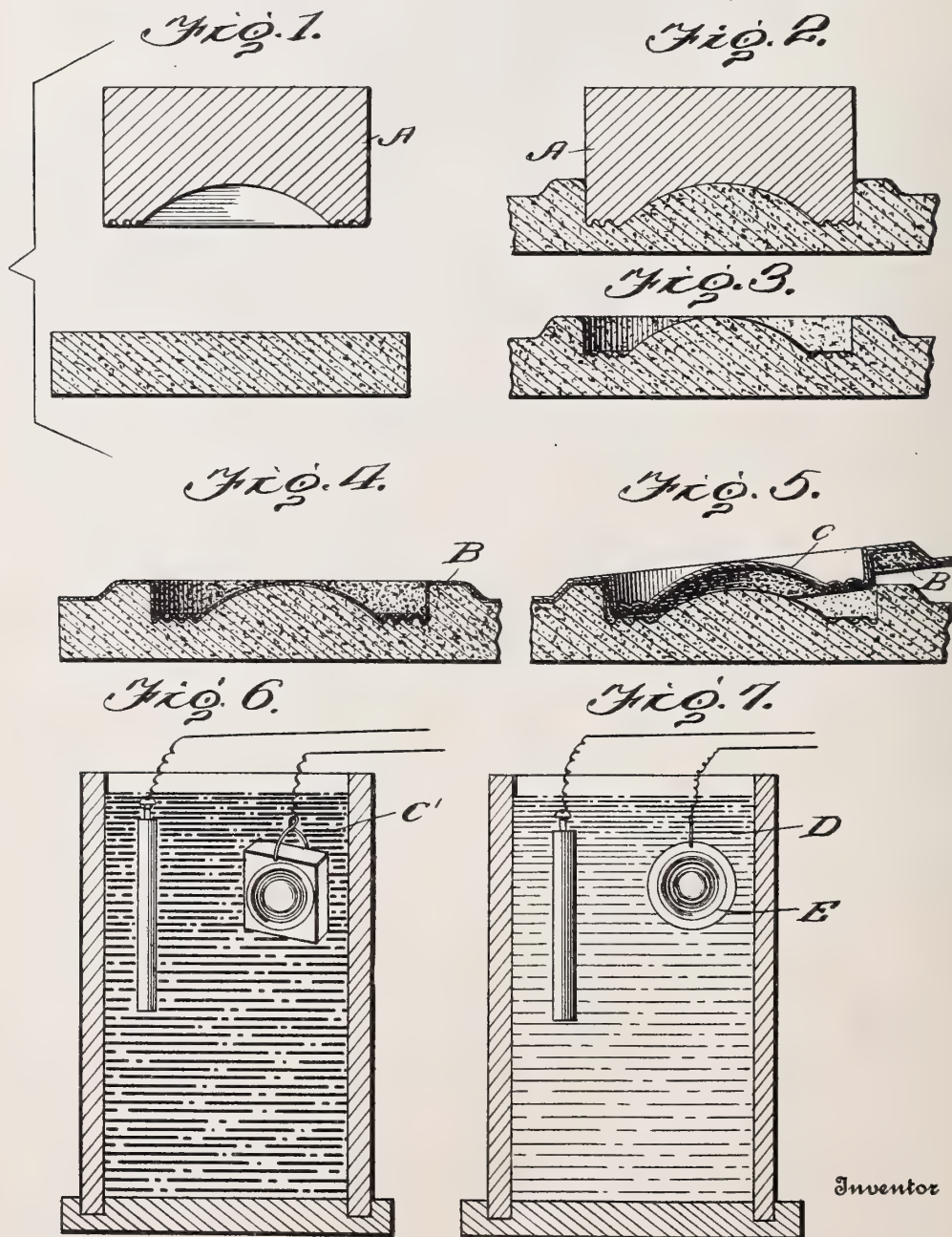
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

METHOD OF MAKING DIAPHRAGMS,
#1,206,881-----H.C. Miller,
Patented-December 5th, 1916.
Filed-June 2nd, 1913.

H. C. MILLER.
METHOD OF MAKING DIAPHRAGMS.
APPLICATION FILED JUNE 2, 1913.

1,206,881.

Patented Dec. 5, 1916.
2 SHEETS—SHEET 1.



Witnesses

W. W. Adams
J. C. Cornwell

Inventor

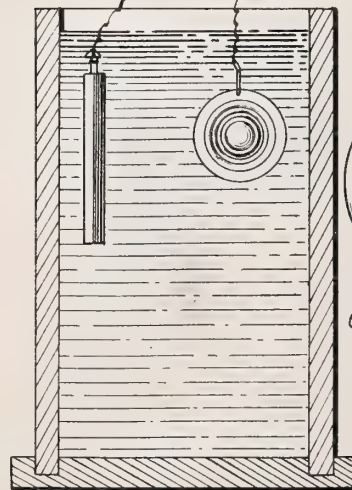
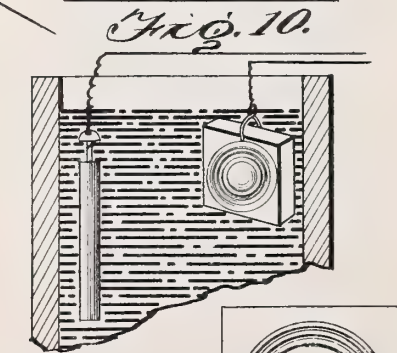
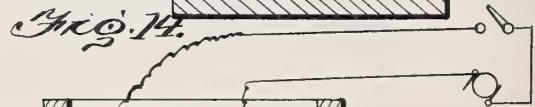
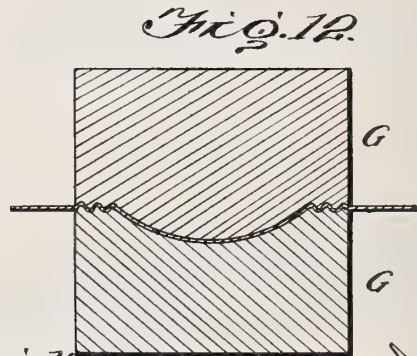
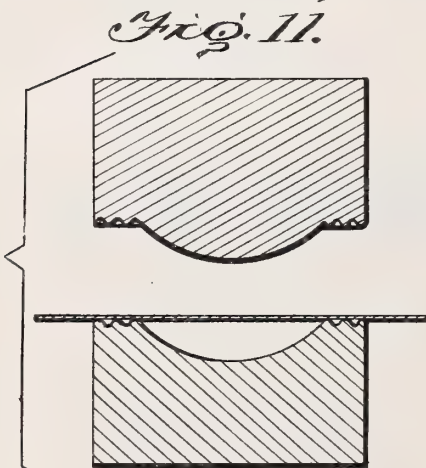
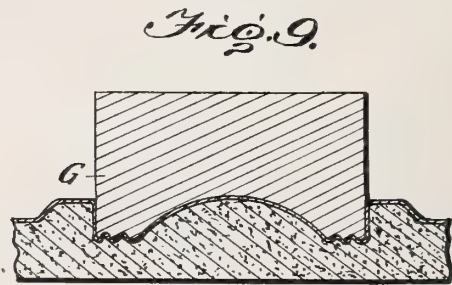
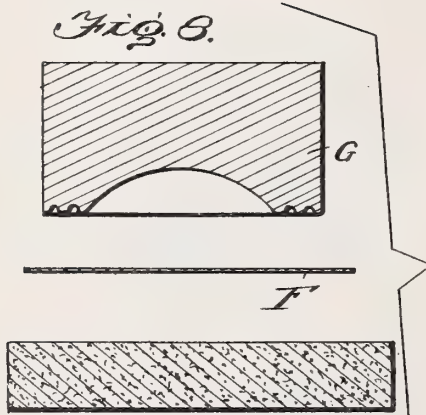
H. C. Miller:

By J. C. Miller
Attorney

H. C. MILLER.
METHOD OF MAKING DIAPHRAGMS.
APPLICATION FILED JUNE 2, 1913.

1,206,881.

Patented Dec. 5, 1916.
2 SHEETS—SHEET 2.



Witnesses
H. C. Miller
H. C. Miller

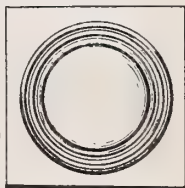


Fig. 13.
By

H. C. Miller.
Attorney

UNITED STATES PATENT OFFICE.

HENRY C. MILLER, OF WATERFORD, NEW YORK.

METHOD OF MAKING DIAPHRAGMS.

1,206,881.

Specification of Letters Patent.

Patented Dec. 5, 1916.

Application filed June 2, 1913. Serial No. 771,357.

To all whom it may concern:

Be it known that I, HENRY C. MILLER, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented certain new and useful Improvements in Methods of Making Diaphragms; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to diaphragms, and the art of making the same.

The making of diaphragms that will receive and reproduce all tones without distortion is exceedingly difficult, but I have discovered a method of producing diaphragms of the most delicate structure, lightness, and desired stiffness. My method also enables me to produce diaphragms of various designs. More or less of the surface can be made elastic or rigid, as desired, the resiliency being of the highest quality which is so necessary to reproduce all the tones. These features are essential and must be incorporated in diaphragms to produce high quality of sound and tone.

The invention also aims to produce a method whereby any number of diaphragms can be made exactly alike to receive and reproduce the same sound qualities, which is not possible by any known process.

In producing a diaphragm from mica, it is impossible to produce two diaphragms exactly alike, because of the layer structure of the material, for one layer too much or too little makes a noticeable difference; consequently the sheets are unbalanced and the thickness of the diaphragms is unequal, and if one is exactly right it is accidental. This can be readily appreciated when producing sound from two instruments side by side of the same value, style, and make, and operating at the same speed. It is therefore positively impossible to make two diaphragms exactly alike by the old method. This is also true when using diaphragms constructed from metal, whether the surfaces be plain or embossed. Other compositions, such as paper, linen, hard rubber, celluloid, are not to be considered in this class,

as is also wood, which cannot be made to withstand the actions of the atmosphere. One of the fundamental reasons why metal diaphragms cannot be made exactly alike is that a strip of metal cannot be rolled perfectly even. This is mechanically an impossibility. Also there are soft and hard spots in strips, as well as buckles in the surfaces that are not perceptible to the eye, and it results that a flat diaphragm made from metal is not a success. The next thing to consider is a corrugated diaphragm struck up either in dish form, or one having ribs of different shape and design, to stiffen or flex the surfaces. In the first place, the uneven thickness and buckles aforesaid in the strips from which the diaphragms are made, must be considered. Let it be said that the male and female embossing dies for making the diaphragms are set approximately correct in the press. It follows if the metal is too soft or too hard, it makes a noticeable difference in the result. If the metal is thicker than the space between the dies, it is apparent the molecules will be put under undue pressure, and if too thin, it will not receive sufficient pressure to form the diaphragm correctly.

In the manufacture of diaphragms, one hundred thousandth of an inch is a big allowance in the thicknesses of the metal, and in the rolling of strips the variation is far greater; also the molecules of the sheets whether put through the rolling process or embossing dies, are unevenly pressed which produces conditions that cannot be made standard; hence such methods are not practical.

To illustrate my invention, I have conventionally illustrated the various steps in the accompanying drawings, in which—

Figure 1 is a sectional view of a die and a block of wax preparatory to making a form. Fig. 2 is a similar view, but showing the die forced into the wax to provide a form. Fig. 3 is a sectional view of the complete form. Fig. 4 is a sectional view of the form provided with a coating of graphite. Fig. 5 is a view showing a detail sectional illustration of the step of removing the semi-complete diaphragm from the form. Fig. 6 is a view conventionally illustrating the graphited wax form receiving a coating of copper. Fig. 7 is a view similar to Fig. 6, but illustrating the copper sheet

as receiving nickel plating to standardize the diaphragm and make same resilient. Fig. 8 is an illustration of a die and block of wax separated, and an interposed sheet of tin foil ready to be pressed. Fig. 9 is a similar view, but showing the die pressing the tin foil into the wax or harder substance. Fig. 10 is a conventional illustration showing the tin foil in the form being nickel plated to standardize the diaphragm. Fig. 11 is a view similar to Fig. 8, but substituting an annealed sheet below standard, instead of tin foil. Fig. 12, is a view showing the die pressing the annealed sheet into the form. Fig. 13 is a view of the interposed sheet. Fig. 14 is a view showing the plate in a nickel bath to stiffen the plate. Fig. 15 is a view of a plain diaphragm made in accordance with my improvement.

I have discovered several methods of manufacturing diaphragms; each being practical, but one makes a diaphragm which produces a little less scratch than the other. In one instance, I make a form A of proper diameter and design, dished or corrugated, or plain, according to the diaphragm to be produced, either of lead or soft or hard steel, or any other substance that will stand the pressure required to press the design into copper plater's wax or bees wax, cover same with graphite B and plate with a thin layer of copper C; then put same in a nickel plating bath D' to give the copper deposit a nickel stiffening D; then remove the so formed diaphragm E from the wax so formed and then give it added nickel stiffening on the back to give it proper resiliency. The combined mold and diaphragm may be put into the nickel plating bath and the copper may be peeled off the plate to make it standard. After the diaphragm is tested to ascertain if it is of sufficient stiffness, and it is found to be deficient in this respect, it is only necessary to clean it thoroughly and again plate it to produce the desired thickness to make it standard.

The second method I employ is to force tin foil F into the wax by the design or form, the sheet of tin foil being laid on the wax, the tin foil then being pressed into the wax by the design form, the foil and wax taking the shape of design; the tin foil acting as a conductor for the nickel plating in place of the graphite and copper. Very thin and highly annealed foil, whether tin, gold, or other highly annealed and thin non-resilient material may be used.

I find that where a diaphragm is provided with a sheet of tin foil of approximately one thousandth of an inch, and then plated with nickel to give it resiliency, the tone of the production will be sweet and a little more of the scratch is eliminated when reproducing a selection, although when the copper plate is used, the diaphragm does

not produce nearly so great a scratching noise as with diaphragms now employed.

I prefer using nickel to stiffen the diaphragm as it is highly resilient, and as it has the same snap as mica it naturally gives the metal the springy resiliency that is so absolutely necessary for diaphragm work. I have further found that the heavier the current used in plating, the stiffer the diaphragm will be, the plating may be used to plate a thin coat of silver or gold, or platinum, different tone effects can be reached, the variation in effects being unlimited.

In lieu of tin foil or graphite, I may substitute an annealed sheet, below standard, as shown in Figs. 11 to 14. The sheet is shaped between forms indicated at G—G. In this instance, the sheet is subjected to a nickel plating process to stiffen it, to make same standard.

The cost of manufacturing diaphragms according to my method is not prohibitive, as there are different means of making the pressed forms where it is not necessary to use wax. This is the now known lead impressions. They may be used indefinitely for receiving the deposit of copper and nickel or other material cited above, or that may be used in plating.

The cost of making male and female dies for pressing resilient diaphragms is almost prohibitive, when it is considered that it is impossible to tell just what form of corrugation of the diaphragm face would answer the best, for every minute detail must be considered, and when it is found that one shape would not do, it would be necessary, no matter how small the difference in the form might be, to make another complete set of dies, but with my method I am able to try different forms and make different shaped diaphragms more cheaply until a design which would work satisfactorily is formed and a steel male and female die could be made therefrom by which diaphragms could be formed from copper, silver, or any other material; the diaphragms could be below standard and brought up to standard by plating.

What I claim is:

1. The art of making a diaphragm, consisting in providing a piece of yielding material, making an impression of a diaphragm in said material, then coating the impression with conducting material, then depositing a thin layer of copper on said conducting material to form a diaphragm base, the said base being below the standard resiliency of a diaphragm, and finally depositing nickel on the diaphragm base by electro-plating for forming a resilient standard diaphragm.

2. The art of making diaphragms, consisting in providing a form corresponding to the shape of a diaphragm, coating said form with conducting material, depositing a layer

of metal on said form by electro-plating to produce a diaphragm base below a standard, removing said diaphragm base from the form and then adding a layer of resilient metal to the base by electro-plating to form a standard diaphragm.

3. The art of making a diaphragm of predetermined form consisting in providing a base to form a diaphragm below a standard, then depositing resilient metal on said base by an electro-plating process to form a resilient standard diaphragm.

4. The art of making a diaphragm of predetermined form, consisting in providing a base of non-resilient metal to form a diaphragm below a standard, then depositing nickel on said base by an electro-plating

process to form a resilient standard diaphragm.

5. The herein described method of making diaphragms consisting in forming a non-resilient diaphragm base below a standard in a form, and subsequently treating the diaphragm base in a bath to deposit a layer of resilient metal thereon to increase the thickness of said base and form thereby a standard resilient diaphragm.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

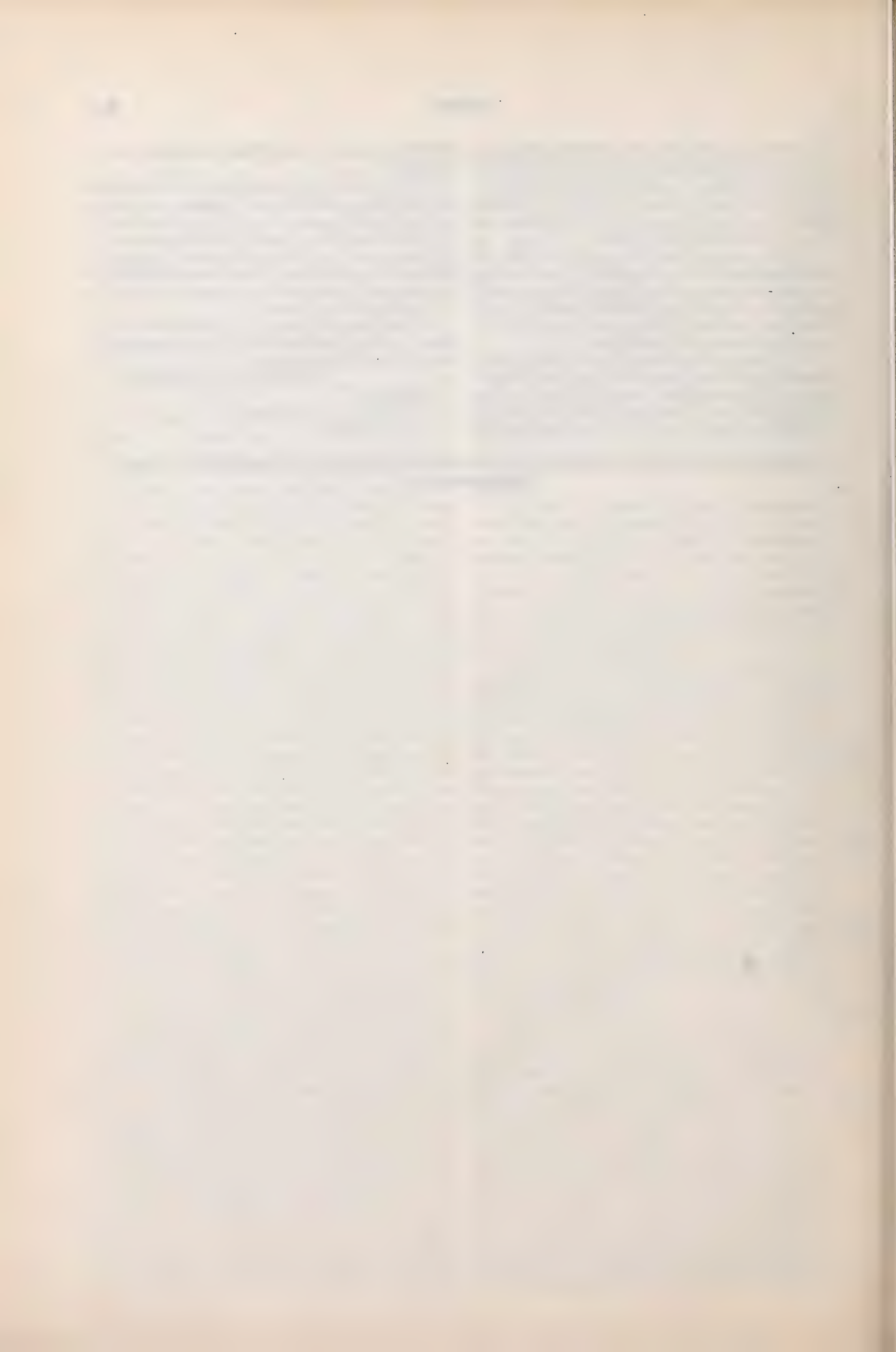
HENRY C. MILLER.

Witnesses:

H. R. VAN KLEECK,

E. F. JELF.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



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DICTATING PHONOGRAPH SYSTEM,
#1,206,987-----H.P:Clausen,
Patented-December 5th, 1916.
Filed-November 14th, 1914.

H. P. CLAUSEN.
 DICTATING PHONOGRAPH SYSTEM.
 APPLICATION FILED NOV. 14, 1914.

1,206,987.

Patented Dec. 5, 1916.

2 SHEETS—SHEET 1.

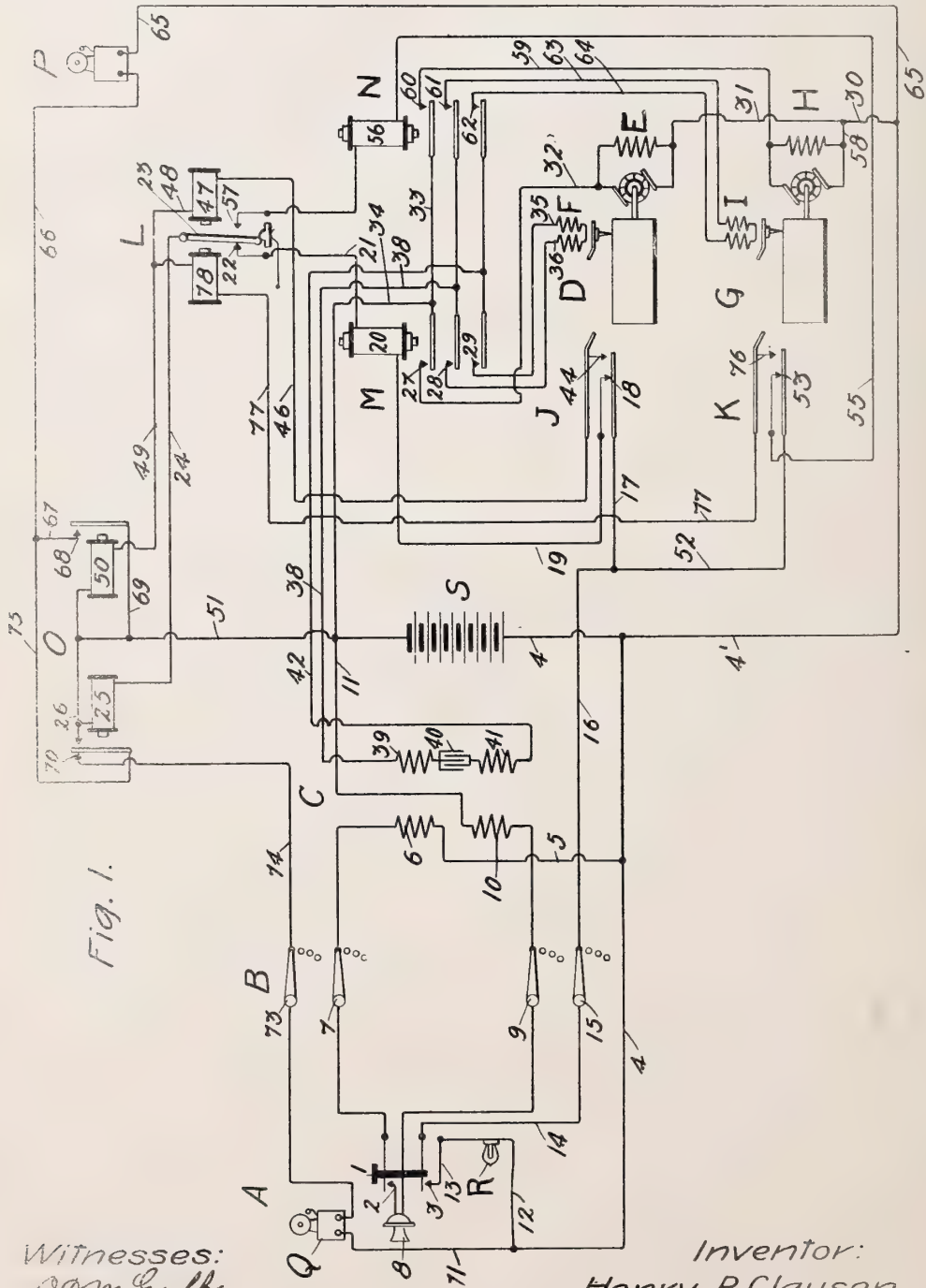


Fig. 1.

Witnesses:
 O. M. Guther.
 R. P. Rossi

Inventor:
 Henry P. Clausen
 by L. C. Channel.
 Att'y.

H. P. CLAUSEN.
 DICTATING PHONOGRAPH SYSTEM.
 APPLICATION FILED NOV. 14, 1914.

1,206,987.

Patented Dec. 5, 1916.

2 SHEETS—SHEET 2.



Fig. 2.

Witnesses:
 O. M. Guthe.
 H. P. Rossi.

Inventor:
 Henry P. Clausen.
 by S. C. Mannel, Att'y.

UNITED STATES PATENT OFFICE.

HENRY P. CLAUSEN, OF MOUNT VERNON, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WESTERN ELECTRIC COMPANY, INCORPORATED, A CORPORATION OF NEW YORK.

DICTATING PHONOGRAPH SYSTEM.

1,206,987.

Specification of Letters Patent.

Patented Dec. 5, 1916.

Application filed November 14, 1914. Serial No. 872,107.

To all whom it may concern:

Be it known that I, HENRY P. CLAUSEN, a citizen of the United States, residing at Mount Vernon, in the county of Westchester and State of New York, have invented a certain new and useful Improvement in Dictating Phonograph Systems, of which the following is a full, clear, concise, and exact description.

This invention relates to a dictating phonograph system, and more particularly to an arrangement of circuits and apparatus therefor, including telephone transmitters and speech recording phonographs. Its general object is the provision of a simple and easily operated means through which dictation may be recorded upon a phonograph without requiring of the dictator the labor and attention heretofore commonly required in the use of such apparatus.

Heretofore it has been in general necessary for the user of such apparatus to insert a phonographic cylinder into the machine, arrange for the proper setting of the recording stylus, and, when the cylinder has been completely filled with dictated matter, remove the cylinder from the machine and insert another cylinder before proceeding with dictation of additional matter. This labor is of such a character that it seriously distracts the attention of the dictator and prevents his giving proper thought to the subject matter of his dictation.

My invention is designed to obviate the necessity, on the part of the dictator, of performing any other labor than he would naturally perform when the matter is dictated directly to a stenographer.

Another object of my invention is to permit the centralizing of all machines used for recording and reproducing the dictated matter, the equipment at the dictator's desk consisting of a suitably arranged transmitter and a push button or the like which may be so arranged as to leave the dictator's hands entirely free when not occupied in starting or stopping the machine. It is obvious that the centralizing of the recording machines permits a number of dictating stations, for example six or more, to be served by a lesser number of recording equipments, for example two or three, it being only necessary to provide means for

permitting the interconnection of the dictator's circuit with that of the recording machines. An attendant, who may also be the transcriber of the recorded matter, takes care of changing the records and of the establishment of necessary circuit connections, so that a dictator may dictate continuously for any desired length of time without interruption.

My invention may be more readily understood by reference to the accompanying drawings, in which—

Figure 1 shows the arrangement of apparatus and circuits embodying my invention; Fig. 2 shows an arrangement for connecting the dictating station to a group of idle phonograph recorders.

Referring more particularly to Fig. 1, the dictator's station equipment A, is arranged to be connected by means of switching apparatus B to an idle phonograph recorder, the variations in the current supply to the dictator's circuit being inductively reproduced through the transformer C, in the circuit of the phonographic recording apparatus. Two of such phonographic devices, D and G, are shown, provided, respectively, with driving means E and H and recording apparatus F and I. The recording apparatus F and I of the phonographic devices actuate the switching apparatus J and K, respectively, when the recorders approach the end of the record receiving cylinders, to switch the connection from the phonograph whose cylinder is filled with the dictated matter to a phonograph of the group having an empty cylinder. The switches J and K control the energization of the relays M and N, which in turn control the driving devices E and H, respectively, and also control the connection of the circuits of the recorders F and I, respectively, to the dictator's line. The circuits of the relays M and N are also under the control of a switching apparatus L which is set in one of a plurality of possible positions when moved into position by one of a plurality of electromagnets controlling the position of this switching apparatus. The parts D, E, F, J and M are duplicated in the parts G, H, I, K and N and may be further duplicated as desired, each set of such parts being represented by a position of the switching arrangement L.

An arrangement of relays O controls the operation of alarms P and Q. The alarm P is operated when either one or both of the phonographic cylinders are completely filled with dictated matter, for it is obviously necessary that when both cylinders are filled and the dictator desires that further matters shall be re-recorded, either one or both of the cylinders be replaced with an empty cylinder by the attendant. It is desirable, however, that when one cylinder has been filled the change be made. Therefore the alarm P is arranged to operate when one cylinder becomes full and continues to operate so long as the dictator continues to leave the dictating station apparatus in its operated position. Should it occur, however, that no attendant is present and both cylinders are filled, then the alarm Q at the dictator's station A will operate, giving a positive signal to the dictator that no further matter can be taken care of. A signal lamp R is provided at the dictator's station A, which lamp, when it burns, serves as an assurance to the dictator that the matter is being properly recorded.

A description in detail of the operation of the aforementioned apparatus and the circuits therefor will now be given. Assuming that all the apparatus is in normal position and that empty cylinders are in both phonographic apparatus D, G, a person desiring to dictate from station A will press a button 1, thereby closing contacts 2 and 3. The closure of contact 2 closes the circuit of the dictator's transmitter set as follows: from battery S over wire 4, wire 5, including a coil 6 of transformer C, switch arm 7, contact 2 of push button 1, transmitter 8, switch arm 9, coil 10 of transformer C, and wire 11 to battery.

The closure of contact 3 closes a circuit for the relay M, as follows: from battery S over wires 4 and 12, signal lamp R, wire 13, contact 3, wire 14, switch arm 15, wire 16, wire 17, contact 18, wire 19, winding 20 of relay M, wire 21, contact 22, switch arm 23, wire 24, relay 25, wires 26 and 51, to battery. The result of the establishment of this circuit is to cause the relay M, and also relay 25 of the relay structure O, to become energized.

When relay M responds, contact 27 in the circuit of the driving device E, and contacts 28 and 29 in the circuit of the recording device F are thereby closed. The closure of contact 27 closes a circuit as follows: from battery S over wires 4, 4', 30 and 31, through motor mechanism or drive device E, wire 32, contact 27, wire 34, to battery S. The establishment of this circuit causes the drive device E to get into action and rotate the cylinder of the phonographic apparatus D.

The closure of contacts 28 and 29, due

to the aforementioned energization of relay M, closes a circuit through the phonographic recorder F as follows: contact 29, wire 35, phonographic recorder coil F, wire 36, contact 28, wire 38, coil 39 of transformer C, condenser 40, coil 41 of transformer C, wire 42 and back to contact 29. This places the dictator's telephone circuit in inductive connection with the phonographic apparatus and the dictator may proceed to speak into the transmitter, which will result in the spoken word being recorded in the well-known manner upon the phonographic cylinder.

Should the dictator release the button 1 at a moment when he is not ready to proceed with the dictation, the consequent opening of contact 3 will cause the relay M to become deenergized and this will result in the phonograph driving mechanism E ceasing to operate, but starting again upon the dictator again pressing the push button 1 when again ready to proceed with the work.

When the recorder F reaches its outermost position, that is, the position in which the cylinder is practically filled with dictated matter, the switch J is operated to close contact 44 and to open contact 18. This results in automatically shifting the dictator's transmitter circuit from one phonograph recorder circuit to another, and is one of the important functions performed by the invention. With any arrangement known to me it has heretofore been necessary for the dictator to pause during the time when a shift is made from one record to another. In my invention, however, the shifting operation is an automatic one and the phonographic apparatus G is brought into service before the apparatus D is cut out of service, thus resulting in an overlapping of the dictated matter in such a manner that there will not be any break in the continuity of the matter dictated. The opening of contact 18, which is in the circuit of the magnet M, results in removing current from said magnet M. This magnet, however, is made of the slow release type so that it will not immediately return to its normal position. Therefore, the driving mechanism E will remain in operation for an appreciable length of time after contact 18 has been opened.

The shifting of the circuit, due to the operation of the switch J will now be described. When contact 44 is closed by the above-mentioned operation of the switch J, the following circuit is established: from battery S, over wires 4 and 12, signal R, wire 13, contact 3, wire 14, switch arm 15, wire 16, the current dividing at this point, one path being over wire 17, contact 44, wire 46, magnet 47 of switching device L, wire 48, wire 49 through winding of alarm relay 50 and wire 51 to battery. The resultant en-

energization of the magnet 47 causes the switch arm 23 of the switching device L to move to its other position and thereby to close the contact 57 in the circuit of the relay

5 N. The other branch of the circuit dividing at the junction point between wires 16 and 17 is as follows: over wire 52, contact 53, wire 55, winding 56 of magnet N, contact 57 of switch L, blade 23 of switch L, wire 24, 10 alarm relay 25, wires 26 and 51 to battery. The establishment of this circuit causes relay N to operate and close the circuit of the drive device H of the phonograph cylinder G as follows: from battery S, wires 4, 4', 15 30 and 58, driving device H, wire 59, contact 60 of relay N, wires 33 and 34, to battery. Likewise contacts 61 and 62 of relay N are closed by the energization of said relay, thereby connecting the recorder of the 20 phonographic apparatus G to the dictator's circuit over wires 63 and 64.

It will be noted that when switch J of the phonographic apparatus D operated, it resulted in removing current from the relay M and therefore started to perform the first 25 operation necessary for stopping the rotation of the phonographic apparatus D. At the same time the operation of said switch resulted in placing current upon magnet 47 of the switch L, which in turn resulted in drawing the switch arm 23 over to the opposite side, thereby opening contact 22 and closing contact 57. The closure of contact 30 57 permitted the relay N to operate. The moment that this relay responds the driving mechanism H comes into action. It will be noted, as hereinbefore stated, that relay M, even though its circuit was opened when relay N was cut into service, is of slow release. 40 Therefore there is a delayed stoppage of phonograph apparatus D, which overlaps the starting period of phonographic apparatus G. For a short time, for example, one-half of a second, the dictated matter will therefore appear upon both cylinders D and 45 G, thus providing the overlapping period necessary to avoid any stoppage in the dictation of the matter to be recorded.

As hereinbefore stated, the signal P is arranged to operate when either or both of the 50 switches J and K are operated. If the switch J is in its operated position, and the cylinder of the phonographic apparatus D is therefore filled, the alarm P will sound, due to the flow of current over the following 55 path: from battery S over wires 4, 4' and 65, alarm signal P, wire 66, wire 67, contact 68, wires 69 and 51 to battery. Should both records be full, that is, should 60 switches J and K both stand operated, when the dictator presses button 1, relay 25 is not energized, since its circuit is not closed at either contact 18 or 53. Therefore contact 70 is closed, with the result that alarm signal 65 Q will sound so long as the push button 1 is

pressed, the following being the circuit through said alarm signal: from battery S, over wires 4 and 71, signal Q, switch arm 73, wire 74, contact 70, wire 75, wire 67, contact 70 68, wire 69, wire 51 to battery. It will be observed that while signal Q operates, signal P also operates, but that signal P may operate when one only of the phonograph apparatus requires a change of cylinders. It is only when all of the phonograph appa- 75 ratus connected to the dictator's circuit is full that the signal Q operates.

I have described the operation when switch J is in its operated position and switch K is in either its non-operated or 80 operated position. If it be assumed that the switch J is in its normal position and that the switch K is then operated by the cylinder of G becoming filled, the consequent closure of contact 76 results in throwing the 85 arm 23 of the switching device L to the right. The circuit for effecting this movement of the arm 23 is as follows: from battery S, over wires 4 and 12, signal R, wire 13, contact 3, wire 14, switch arm 15, wire 16, wire 52, contact 76, wire 77, magnet 78, 90 wire 49, relay 50 and wire 51 to battery.

The magnet 78 being thereby energized to move the arm 23 to close the circuit of the relay M at contact 22, the necessary circuits 95 for starting the driving mechanism of the apparatus D and for switching the dictator's transmitter circuit to the circuit of the recording device F are established, as will be readily understood from the foregoing 100 description. It thus appears that when either of the phonograph cylinders is filled, the dictator is automatically connected to another phonograph of the group, provided there is one ready to record his dictation. 105 Otherwise the signal Q operates to warn him that his transmitter is not connected to a phonograph recorder.

Fig. 2 shows one dictator's station A connected to a set of switching plugs T. An 110 alarm signal 79 is provided as also a sub-alarm signal 80. I have shown this signal apparatus mainly for the purpose of indicating that when the push button 1 at the dictator's station is pressed, a relay 82 will 115 respond through the signal lamp R and cause the actuation of the alarm signal 79 and sub-alarm signal 80. The attendant's attention is then drawn to the necessity for establishing a dictating circuit and she may 120 then place the set of plugs T into one set of the switching jacks U connecting to an idle recording group. As is also shown in Fig. 2, instead of the switching plugs an ordinary switch B, such as is shown in Fig. 1, 125 may be used, the signal mechanism operating similarly to that just described and the attendant, when responding, placing the switch into connection with an idle phonographic recording circuit. Fig. 2 also shows 130

another set of plugs T' corresponding to another dictating station, said set having its sub-alarm 81 under the control of relay 83.

What is claimed is:

1. In a dictating phonograph system, a dictator's transmitter set, a group of phonographic recording apparatus, and means including a slow-acting relay for automatically establishing a connection between said transmitter and said apparatus in succession.

2. In a dictating phonograph system, a dictator's transmitter set, a group of phonographic recording apparatus, and means including a slow-acting relay for automatically shifting the connection between said transmitter and one of said apparatus to another, said relay being associated with one of said apparatus and arranged to control the connection between its associated apparatus and the transmitter.

3. In a dictating phonograph system, a dictator's transmitter set, a group of phonographic recording apparatus, a plurality of slow-acting relays, one provided for each apparatus, means including said relays for establishing a connection between said transmitter and any one of said apparatus, each of said relays being arranged to momentarily maintain the connection between the transmitter set and the apparatus associated with said relay, after a connection has been established between said transmitter and another apparatus.

4. In a dictating phonograph system, a dictator's transmitter set, a group of phonographic recording apparatus, means including a plurality of slow-acting relays for establishing connection between said transmitter and any one of said apparatus, each of such relays being associated with one apparatus and arranged to maintain a connection between its associated apparatus and said transmitter, means operative upon complete operation of one of said apparatus for causing a relay associated therewith to sever the connection between the said apparatus and transmitter, and means including the relay associated with another apparatus for transferring the connection to the last mentioned apparatus.

5. In a dictating phonograph system, the combination of a dictator's station provided with a transmitter set, an attendant's station provided with a group of phonographic recording devices, a circuit connecting said dictator's station with said attendant's station, an electromagnetically-operated contact device for placing said recording devices one at a time in an operative relation with said transmitter set, and means automatically operated upon the completion of the operation of one of said recording de-

vices for operating the contact device to place another one of said recording devices in an operative position with said transmitter set.

6. In a dictating phonograph system, a dictator's transmitter set, a group of phonographic recording apparatus, means for establishing a connection between said transmitter set and one of said apparatus, automatic means for transferring said connection from one apparatus to the other, and means associated with the first-mentioned means for maintaining the first mentioned connection for a short period of time after the operation of said automatic means.

7. In a dictating phonograph system, a dictator's telephone line, a plurality of phonographic recording apparatus, means for extending said line to said apparatus, a relay for each of said apparatus controlling the connection of the extended line to its associated apparatus, and means determined by the position of each one of said plurality of apparatus for operating one of said relays.

8. In a dictating phonograph system, a dictator's transmitter set, a plurality of phonographic recording apparatus, means for establishing a connection between said transmitter set and one of said apparatus, an electromagnetically-operated circuit-controlling device for controlling the shifting of said connection from one apparatus to the other, and means controlled by said plurality of apparatus for operating said device.

9. In a dictating phonograph system, a dictating transmitter set, a group of phonographic recording apparatus, and means including a plurality of slow-acting relays for automatically establishing a connection between said transmitter and said apparatus in succession, said relays being associated, one with each of said apparatus, and arranged to control the connection between its associated apparatus and the transmitter.

10. In a dictating phonograph system, a dictating transmitter set, a plurality of phonographic recording apparatus, means including slow-acting relays for automatically connecting said transmitter to said apparatus in rotation, each of said relays being associated with one of said apparatus and arranged to control the operation of its associated apparatus.

In witness whereof, I hereunto subscribe my name this 13th day of November, A. D. 1914.

HENRY P. CLAUSEN.

Witnesses:

E. EDLER,
K. L. STAHL.

REPRODUCING NEEDLE,
#1,207,350-----A. B. Wahlquist & F.D.Hall,
Patented-December 5th, 1916.
Filed-November 25th, 1914.

A. B. WAHLQUIST & F. D. HALL.
REPRODUCING NEEDLE.
APPLICATION FILED NOV. 25, 1914.

1,207,350.

Patented Dec. 5, 1916.

Fig. 6.

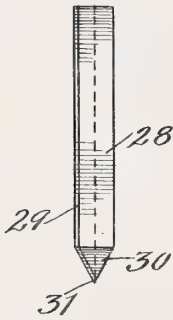


Fig. 1.

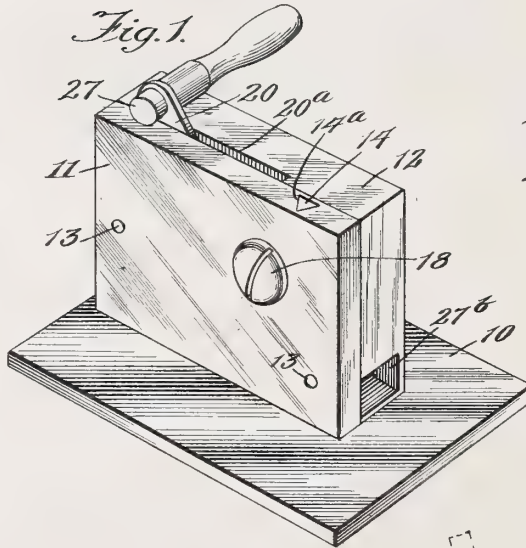


Fig. 7.

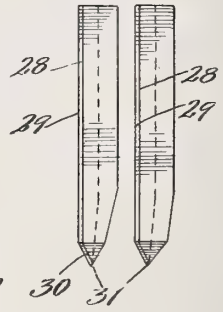


Fig. 2.

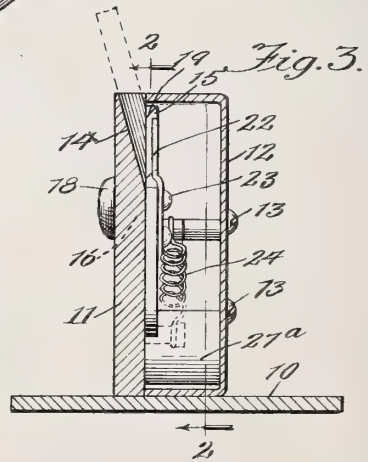
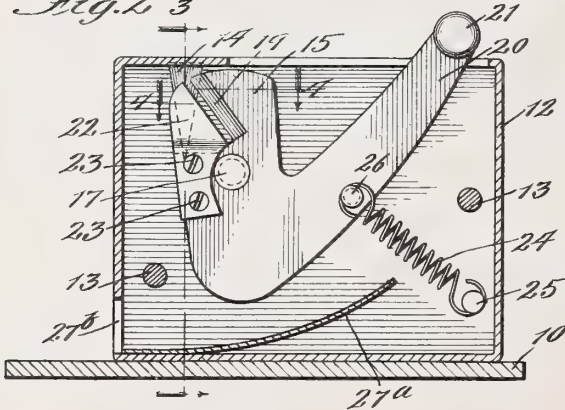
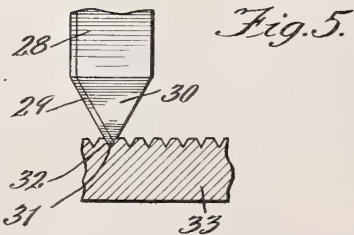
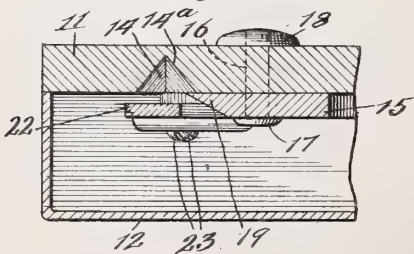


Fig. 4.



Witnesses:

W. D. Perry
W. B. Barrett

Inventors:
Alvin B. Wahlquist
Frederick D. Hall
By *James O. Addington* Attorney

UNITED STATES PATENT OFFICE.

ALVIN B. WAHLQUIST AND FREDERICK D. HALL, OF CHICAGO, ILLINOIS; SAID
WAHLQUIST ASSIGNOR TO SAID HALL.

REPRODUCING-NEEDLE.

1,207,350.

Specification of Letters Patent.

Patented Dec. 5, 1916.

Application filed November 25, 1914. Serial No. 873,886.

To all whom it may concern:

Be it known that we, ALVIN B. WAHL-
QUIST and FREDERICK D. HALL, both citizens
of the United States, residing at Chicago,
in the county of Cook and State of Illinois,
have invented certain new and useful Im-
provements in Reproducing-Needles, of
which the following is a full, clear, con-
cise, and exact description, reference being
had to the accompanying drawing, forming
a part of this specification.

Our invention relates to reproducing
needles.

It has been found that when fiber needles
are used in phonographs the point and sides
of the needle soon become so worn that it
no longer does good work. In order that the
needle may be used again it has been cus-
tomary to remove a thin shaving of uniform
thickness from the end of the needle. When
bamboo needles are used it has been found
that the last fibers to be cut are apt to spring
away from the cutting edge as there are no
other fibers to back them up, resulting in
a poor point.

One of the objects of our invention is to
prevent this splitting off of the fibers.

Further objects will appear from the de-
tailed description to follow.

In the drawings, in which we have illus-
trated one embodiment of our invention;
Figure 1 is a perspective view of the complete
cutter; Fig. 2 is a section on the line 2—2
of Fig. 3 showing the manner in which the
cutting member is mounted on the upright
support; Fig. 3 is a view on the line 3—3
of Fig. 2, showing the relation of the hous-
ing to the support, and showing also the
angle at which the cutting edge engages the
needle; Fig. 4 is a section on the line 4—4
of Fig. 2, showing the relation of the guard
to the passage which guides the needle; Fig.
5 is a detail view on an enlarged scale of a
common form of fiber needle showing the
manner in which it engages a phonograph
record; Fig. 6 is an enlarged view of a com-
mon form of fiber needle before it has been
operated on by the repointing cutter; and
Fig. 7 is a view showing a plurality of needles
which have been repointed a different
number of times.

Referring now to the drawing in detail
the device includes a base 10, an upright
support 11 secured to the base in a suitable
manner, and a housing 12 for the operating

mechanism secured to the support 11 in any
suitable manner as by screws 13. The sup-
port 11 has a passage 14 therein extending
from its upper face to the inner face of the
support. This passage is angular in cross
section, one of its sides being indicated at
14^a. A cutter member 15 is pivotally se-
cured to the support 11 by means of a screw
16 having a head 17 engaging said cutter
member, said screw extending through the
support 11 and being held in place by means
of a rounded off nut 18. The cutter mem-
ber 15 has a cutting edge 19 which moves
over the inner surface of the support 11 ad-
jacent the passage 14. The cutting member
is also provided with an operating member
20 extending through an opening 20^a in the
top of the housing 12, and said operating
member has secured thereto by means of a
screw 27 an operating handle 21. A guard
member 22 is secured to the cutting member
15 in any suitable manner as by screws 23.
A spring 24 connected to the support 11 by
means of a pin 25 and connected to the oper-
ating member 20 by means of a pin 26 serves
to return the cutting member after it has
been operated. The screw 27 serves to limit
the movement of the operating member by
coming in contact with the support 11. A
curved plate 27^a secured to the housing 12
in any suitable manner, as by soldering, is
provided to catch the clippings as they are
removed. The housing 12 is provided with
an opening 27^b through which the clippings
may be removed from the housing.

28 indicates a well known form of fiber
needle formed of bamboo having a thin hard
shell 29 which consists of the outer shell of
the bamboo stalk. One end of the needle is
beveled off as at 30 forming a point 31 for
engagement with the grooves 32 of a phono-
graph record 33.

The operation of our device is as follows:
After a fiber phonograph needle has been
used for some time the extreme point and
sides of the needle become worn so that it no
longer does good work. To repoint the
needle it is inserted in the triangular open-
ing 14 with the hard cortex side 29 of the
needle adjacent the side 14^a of the opening
or passage 14. The needle drops into the
opening until it engages the guard 22 on
the cutting member 15. The cutting mem-
ber 15 is then operated to remove a thin slice
from that one of the soft sides of the needle

adjacent the point 31. It will be noted that the extreme point and sides of the needle will be removed by this operation as indicated in Fig. 7. In Fig. 7 about three cuts have been removed from the needle shown on the left hand and about one cut from the needle shown on the right hand. It will be noted that the cut on the soft side commences quite low down toward the point and gradually rises, taking off more of the soft fiber as the number of cuts increases, and as only a very thin slice is removed at each operation of the cutting member, the needle may be used and repointed a considerable number of times.

In the use of the needle on the record, the wear is all on the extreme point and while the disk is revolving the point of the needle fits closely against the side of the groove and as the side of the groove varies in its angular direction and the disk revolves at a high rate of speed, the point of the needle is worn and frayed or splintered a little.

Heretofore in the repointing by the use of all other machines or devices, the cut has followed the direction of the original cut and as there has been no material back of the point to reinforce it, the new cut very frequently not only fails to take off the frayed and splintered point but in the cutting accentuates the splintering as it is clearly apparent that there is nothing back of the extreme point to prevent such action of the cutting blade. In our device, however, it will be noted that every time the needle is repointed, the cutting blade presses against the soft side adjacent the outer shell and in removing the thin shaving, the needle is pressed tightly against the back of the groove and the fibers of the needle forced more tightly together and held against fraying by the mere movement of the cutting blade itself. Therefore, in our device instead of there being any tendency to fray the needle, the tendency is all in the opposite direction and the repointed needle is as good as new and gives as good results in playing as the original needle.

It is thought that our present device is a distinct advance in the art and that a cutter has now been produced that will not only repoint the needles a large number of times, but will also repoint them in such a way as to give a perfect point after each operation. In practice, we have found that good results were obtained by making the passage extend at an angle of 10 to 15 degrees from the plane in which the cutter moves, although conditions may arise in which other angles may be used, but in the main the cut is along the general direction of the fiber of the needle itself, thus serving to pack such fiber more closely together instead of separating them as in other cutters. This particular method of sharpening a fiber needle

is the best practical method for many reasons. It is not repointing in the ordinary sense of the word because it makes a new and fresh point in a manner entirely different from the original one. The operation is more like sharpening a lead pencil, in that the grain is cut lengthwise instead of transversely, thus insuring a perfectly even and smooth cut on the cortex side of the fiber. The cutter also has this advantage, that it is not necessary to hold the needle in position against the guard as the weight of the needle itself holds it there. It is also thought to be the only fiber needle cutter that can be attached to the talking machine or to the cabinet on which the machine sets and be used without the assistance of the hands for holding it in place.

Another great advantage is that the original cut made at the factory by expensive machinery, and which is a clean cut on the cortex side, is not disturbed by using the new cutter, except at the extreme end, the pulp and a very small portion of the cortex at the point of the needle only being removed.

It is to be noted that when the needle is originally made, that is, the first cut made by the machine cutters, the last portion of the needle to be acted on by the cutter blade is the extreme point of the cortex at, for instance, the point marked 31 in Fig. 6. When this cut is made there is nothing back of the needle and there is consequently great liability of the extreme point of the cortex being disturbed. This condition is not apparent to the eye or even to an ordinary microscope, but it is evident that the condition does exist and is the cause often of needles wearing quickly at the extreme point. However, it is to be noted that by the first cut made by the repointing device covered by this application, an entirely new point is made. The possibly weakened original point is removed and the new point having as a backing the entire body of the needle is often of finer grain and more wearable structure than the original point.

Having thus described our invention what we claim as new and desire to secure by Letters Patent is;—

1. A fiber reproducing needle having a thin hard shell on one side thereof, having a triangular cross section, and having one end beveled so as to form a point on the shell portion, and having that one of the soft sides of the needle which runs down to the point of the needle beveled off adjacent the point of the needle.

2. The method of repointing a fiber reproducing needle having a thin hard shell on one side thereof, having a triangular cross section, and having one end beveled so as to form a point on the shell portion, which method consists in removing a thin

slice off of that one of the soft sides of the needle which is adjacent the point of the needle together with the extreme point of the needle.

5 3. The method of repointing a fiber reproducing needle having a thin hard shell on one side thereof, having an angular cross section, and having one end beveled so as to form a point on the shell portion, which
10 method consists in removing a thin slice off of that one of the soft sides of the needle which is adjacent the point of the needle together with the extreme point of the needle.

15 4. A fiber reproducing needle having a thin hard shell on one side thereof, having

an angular cross section, and having one end beveled so as to form a point on the shell portion, and having that one of the soft sides of the needle which runs down to the point of the needle beveled off adjacent the point of the needle. 20

In witness whereof, we have hereunto subscribed our names in the presence of two witnesses.

ALVIN B. WAHLQUIST.
FREDERICK D. HALL.

Witnesses:

MARGARET M. CASEY,
SAM JOHNSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



SOUND RECORD TABLET,
#1,207,383-----T. A. Edison,
Patented-Dec. 5th, 1916
Filed-January 30th, 1913.

T. A. EDISON.
SOUND RECORD TABLET.
APPLICATION FILED JAN. 30, 1913.

1,207,383.

Patented Dec. 5, 1916.

PHENOLIC FINAL CONDENSATION PRODUCT PLASTIC AT ELEVATED TEMPERATURES



ONE PART THERMOPLASTIC BINDER TO AT LEAST $3\frac{1}{2}$ PARTS OF FIBROUS FILLER

Witnesses:

Jos. M. Gutstadt
Frederick Bachmann

Inventor:

Thomas A. Edison
by Dyer & Holden

W. S. W. W. S.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR TO
NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION
OF NEW JERSEY.

SOUND-RECORD TABLET.

1,207,383.

Specification of Letters Patent.

Patented Dec. 5, 1916.

Application filed January 30, 1913. Serial No. 745,232.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Sound-Record Tablets, of which the following is a description.

My invention relates to sound record tablets and more particularly, but not exclusively, to composite disk shaped sound record tablets having a body containing a fibrous inert filler and a surface veneer of a material adapted to receive a sound record impression. Both the body and the surface veneer in the preferred tablets contemplated by this invention are thermo plastic, that is, they are adapted to be rendered plastic by the application of heat, the body being preferably fusible or thermo plastic to a larger degree than the surface veneer. The preferred composition for the body of the tablet is composed of a filler, such as wood flour, together with a binder of fusible resin, such as the phenol or cresol resin formed by reaction between definite amounts of phenol or cresol and formaldehyde or equivalents. The resin I preferably employ melts at approximately 220° Fahr. and when subjected to pressure in the mold with the application of sufficient heat flows between the mold plates so as to permit an even printing of the record tablet. The surface veneer is preferably formed of a hard final phenolic condensation product, such as described in U. S. Patents to Jonas W. Aylsworth, Nos. 1,020,593, 1,046,137 and 1,046,420, this composition containing a plasticity ingredient, such as penta-chloro-phenol, whereby upon application of sufficient heat the surface veneer may be rendered sufficiently plastic to receive a sound record impression. I prefer to use for the veneer a composition of this last named class which becomes plastic at about 320° Fahr. When a tablet having a veneer and body of the preferred compositions mentioned above is subjected in the mold to the necessary temperature and pressure to impress the sound waves in the surface of the veneer, the body, because of the fluid condition of the binder, will have a tendency to flatten out, this tendency being resisted by the fibrous filler.

The principal object of my invention is to provide a sound record tablet of the class described which can be repressed to efface an old record impression and to form a new record impression in the surface of the tablet a number of times without objectionable increase in diameter, decrease in thickness, or other objectionable change in shape.

Another object of my invention is to provide a sound record tablet provided with a surface veneer having such hardness, thickness, or other characteristics that the rough filler of the backing cannot be impressed into the outer surface of said veneer during the repeated repressing of the tablet.

Other objects of my invention will appear more fully in the following specification and appended claims.

In order to prevent objectionable change in shape in the tablet during the repressing thereof, I find that the proportion of the fibrous filler with respect to the binder in the body of the tablet must not be less than a given amount. When the proportion of the filler to the binder is less than this amount, as has heretofore been the case, the lateral flow of the composition forming the body of the tablet each time the tablet is reheated and repressed produces an objectionable enlargement of the diameter of the tablet and a corresponding reduction in the thickness thereof; so that there is such a variation between the shapes of the new records which have been pressed and molded only once and the records which have been repressed a number of times that the uniformity of shape and size desired for a commercial record is not obtained. The relative amounts of filler and binder which are necessary depend, of course, to some extent, upon the materials employed for the filler and binder. When the binder is formed of the fusible resinous condensation products referred to above or other similar products, and the filler is formed of wood flour, I find that the weight of the wood flour should not be less than three and a half times the weight of the resin. The preferred proportion by weight of the fibrous filler to the resinous binder referred to is four to one, but this proportion may be increased up to four and one half or even five to one. A tablet having a body formed of these proportions of fusi-

ble binder and fibrous filler may be readily repressed or reprinted at least ten times without undergoing any objectionable increase in diameter and decrease in thickness.

5 The thickness of the surface veneer to prevent the fibers in the body of the record from being pressed through the veneer to the outer surface thereof during the pressing or re-pressing of the record depends upon
10 the composition of which the veneer is formed. When the veneer is formed of the thermo plastic hard final phenolic condensation products referred to, the thickness thereof should be not less than .0015 of an
15 inch and should preferably be about .0025 of an inch.

In the preferred form of my invention, the title of the record and the sound record impression are impressed into the surface of
20 the tablet at the same time, as shown, for example, in an application of Jonas W. Aylsworth and Edward L. Aiken, Serial No. 704,517, filed June 17, 1912, and entitled improvements in the production of sound
25 records. Obviously, when the title is impressed into the record tablet in this way, a single operation is sufficient to efface the old record impression and title and to imprint in place thereof the new record im-
30 pression and title.

Various compositions other than those mentioned above may be used for forming the veneer and the body of the record. Thus the veneer may be formed of celluloid and
35 the binder may be formed of copal gum, shellac or numerous other resinous compositions.

The invention in some of its aspects is not limited to a record tablet having a separate
40 veneer secured to a suitable body.

In the drawing forming a part of this specification is shown a cross section of one embodiment of my invention, the material employed in the said embodiment being de-
45 scribed in the drawing.

What I claim as new and desire to protect by Letters Patent of the United States is as follows:

1. As a new article of manufacture, a sound
50 record tablet having a body composed of a thermo-plastic binder and a fibrous filler in the proportion of one part by weight of binder to at least three and a half parts by weight of filler, and a surface veneer for
55 said body composed of a final phenolic condensation product which is sufficiently plastic at elevated temperatures to be molded, substantially as described.

2. As a new article of manufacture, a sound
60 record tablet having a body composed of a binder of thermo-plastic condensation product and a fibrous filler in the proportion of one part by weight of binder to at least three and a half parts by weight of filler, and a
65 surface veneer for said body composed of a

final phenolic condensation product which is sufficiently plastic at elevated temperatures to be molded, substantially as described.

3. As a new article of manufacture, a sound
70 record tablet having a body composed of a thermo-plastic phenolic binder and a fibrous filler in the proportion of one part by weight of binder to at least three and a half
75 parts by weight of filler, and a surface veneer for said body composed of a final phenolic condensation product which is sufficiently plastic at elevated temperatures to be molded, substantially as described.

4. As a new article of manufacture, a sound
80 record tablet having a body composed of a thermo-plastic binder of condensation product and a fibrous filler in the proportion of one part by weight of binder to at least three
85 and a half parts by weight of filler, substantially as described.

5. As a new article of manufacture, a sound
record tablet having a body composed of a thermo-plastic phenolic binder and a fibrous
90 filler in the proportion of one part by weight of binder to at least three and a half parts by weight of filler, substantially as described.

6. As a new article of manufacture, a sound
record tablet having a body composed of a
95 thermo-plastic binder and a fibrous filler in the proportion of one part by weight of binder to at least three and a half parts by weight of filler, and a surface veneer for
100 said body composed of a final phenolic condensation product which is sufficiently plastic at elevated temperatures to be molded, said veneer being at least .0015 of an inch
in thickness, substantially as described.

7. As a new article of manufacture, a sound
105 record tablet having a body composed of a thermo-plastic binder and a fibrous filler in the proportion of one part by weight of binder to at least three and a half parts by
110 weight of filler, and a surface veneer for said body composed of a final phenolic condensation product which is sufficiently plastic at elevated temperatures to be molded, said veneer being approximately .0025 of an
115 inch in thickness, substantially as described.

8. As a new article of manufacture, a disk
shaped sound record tablet having a body
120 composed of a fusible binder and a fibrous filler in the proportion of one part by weight of binder to at least three and a half parts by weight of filler, and a surface veneer for
said body composed of a final phenolic condensation product containing a plasticity
ingredients, substantially as described.

9. As a new article of manufacture, a
125 sound record disk having a body composed of a fusible binder and a finely divided fibrous filler in the proportion of one part by weight of binder to four parts by weight
130 of filler, and a surface veneer for said body

composed of a final phenolic condensation product containing a plasticity ingredient, substantially as described.

10. As a new article of manufacture, a
5 disk shaped sound record tablet having a
body composed of a binder of fusible resin
and a fibrous filler in the proportion of one
part by weight of binder to at least three
and a half parts by weight of filler, and a
10 surface veneer for said body composed of
a final phenolic condensation product con-
taining a plasticity ingredient, substantially
as described.

11. As a new article of manufacture, a
15 disk shaped sound record tablet having a
body composed of a fusible binder and filler
of wood flour in the proportion of one part
by weight of binder to at least three and a
half parts by weight of filler, and a surface
20 veneer for said body composed of a final
phenolic condensation product containing
a plasticity ingredient, substantially as de-
scribed.

12. As a new article of manufacture, a
25 disk shaped sound record tablet having a
body composed of a binder of fusible resin
and filler of wood flour in the proportion of
one part by weight of binder to at least
three and a half parts by weight of filler,
30 and a surface veneer for said body com-
posed of a final phenolic condensation prod-
uct containing a plasticity ingredient, sub-
stantially as described.

13. As a new article of manufacture, a
35 sound record tablet having a body composed
of a fibrous filler and a fusible binder in
the proportion of one part by weight of
binder to at least three and a half parts by
weight of filler, and a thermo plastic ve-
40 neer on said body, the temperature at which
said binder melts being lower than that at
which said veneer becomes plastic, substan-
tially as described.

14. As a new article of manufacture, a
45 sound record tablet having a body composed
of a fibrous filler and a binder which melts
at a temperature less than 300 degrees Fahr.
in the proportion of one part by weight of
binder to at least three and one-half parts
50 by weight of filler, and a veneer for said

body which becomes plastic at a tempera-
ture above 300 degrees Fahr., substantially
as described.

15. As a new article of manufacture, a
sound record tablet having a body composed 55
of a fibrous filler and a binder which melts
at a temperature of approximately 220 de-
grees Fahr. in the proportion of one part
by weight of binder to at least three and
one-half parts by weight of filler, and a 60
veneer for said body which becomes plastic
at a temperature of approximately 320 de-
grees Fahr., substantially as described.

16. As a new article of manufacture, a
sound record tablet having a body composed 65
of a finely divided fibrous filler and a fusi-
ble binder in the proportion of one part by
weight of binder to at least three and a half
parts by weight of filler, and a thermo plas-
tic veneer on said body, the temperature at 70
which said binder melts being lower than
that at which said veneer becomes plastic,
substantially as described.

17. As a new article of manufacture, a
sound record tablet having a body composed 75
of a finely divided fibrous filler and a binder
which melts at a temperature less than 300
degrees Fahr. in the proportion of one part
by weight of binder to at least three and
one-half parts by weight of filler, and a 80
veneer for said body which becomes plas-
tic at a temperature above 300 degrees Fahr.,
substantially as described.

18. As a new article of manufacture, a
sound record tablet having a body composed 85
of a finely divided fibrous filler and a binder
which melts at a temperature of approxi-
mately 220 degrees Fahr. in the proportion
of one part by weight of binder to at least
three and one-half parts by weight of filler, 90
and a veneer for said body which becomes
plastic at a temperature of approximately
320 degrees Fahr., substantially as described.

This specification signed and witnessed
this 29th day of January, 1913.

THOS. A. EDISON.

Witnesses:

FREDERICK BACHMANN,
MARY J. LAIDLAW.

The first part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a full understanding of the present. The author then proceeds to a detailed examination of the early years of the Republic, from the time of the signing of the Declaration of Independence to the end of the War of 1812. This section covers the political, social, and economic developments of the period, and the role of the various states in the formation of the new nation. The author also discusses the influence of the Enlightenment on the American mind, and the role of the Founding Fathers in shaping the new government. The second part of the paper deals with the period from 1812 to 1860, and the events leading up to the Civil War. This section covers the expansion of the United States into the West, the growth of the slave economy in the South, and the increasing tensions between the North and the South. The author also discusses the role of the various political parties of the time, and the impact of the war on the country. The third part of the paper deals with the Civil War itself, from 1861 to 1865. This section covers the military and political events of the war, and the role of the various leaders. The author also discusses the impact of the war on the country, and the role of the Reconstruction period in the years following the war. The final part of the paper deals with the Reconstruction period, from 1865 to 1877. This section covers the efforts to rebuild the South, the role of the Freedmen's Bureau, and the eventual restoration of the South to the Union. The author also discusses the impact of the Reconstruction period on the country, and the role of the various political parties of the time.

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APPARATUS AND METHOD FOR PRODUCING
VIBRATORY MOTIONS,

#1,207,387-----R. A. Fessenden,
Patented-December 5th, 1916.
Filed-January 2nd, 1913.

R. A. FESSENDEN.
 APPARATUS AND METHOD FOR PRODUCING VIBRATORY MOTIONS.
 APPLICATION FILED JAN. 2, 1913.

1,207,387.

Patented Dec. 5, 1916.

Fig. 1 -

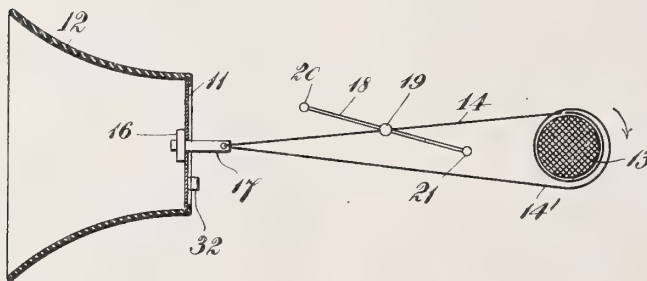


Fig. 2.

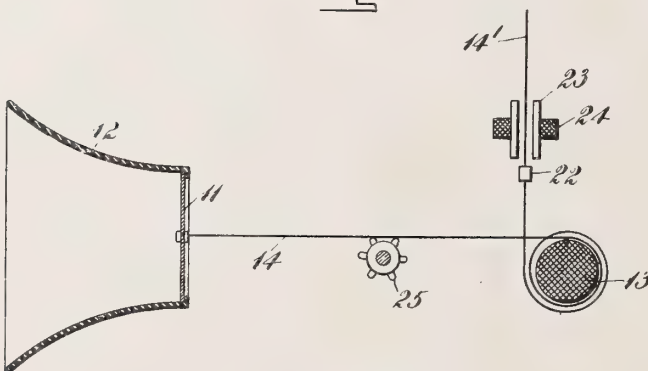
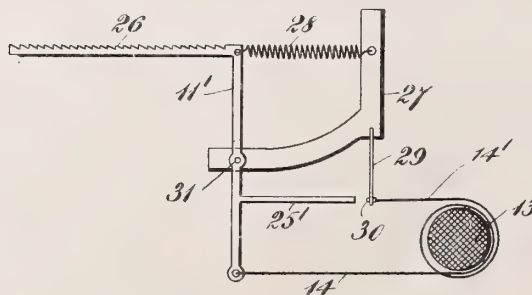


Fig. 3.



WITNESSES:

W. E. Flaherty.
A. E. O'Brien.

INVENTOR:

Rogers A. Fessenden
By [Signature]
Attorney

UNITED STATES PATENT OFFICE.

REGINALD A. FESSENDEN, OF BROOKLINE, MASSACHUSETTS, ASSIGNOR TO SUBMARINE SIGNAL COMPANY, OF WATERVILLE, MAINE, A CORPORATION OF MAINE.

APPARATUS AND METHOD FOR PRODUCING VIBRATORY MOTIONS.

1,207,387.

Specification of Letters Patent.

Patented Dec. 5, 1916.

Application filed January 2, 1913. Serial No. 739,630.

To all whom it may concern.

Be it known that I, REGINALD A. FESSENDEN, of Brookline, in the county of Norfolk and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement in Apparatus and Methods for Producing Vibratory Motions, of which the following is a specification.

My invention relates to means for securing a vibratory movement and more particularly to means for signaling by sound waves. I have shown certain means, but I do not mean to confine myself to the means shown as other means will suggest themselves to those skilled in the art.

I have shown in the drawings the preferred forms of securing my desired result, but I do not mean to limit myself to the exact forms shown. My invention, however, will be understood from the drawings, in which—

Figures 1 and 2 show diagrammatically two embodiments of my invention applied in each case to a diaphragm, and Fig. 3 shows diagrammatically a third embodiment of the said invention.

Referring to Fig. 1, 11 is a diaphragm closing one end of a horn 12 mounted in fixed position. 14, 14' is a wire or preferably band of thin steel or a thin stiff metal tube. In the case of a band it is best made of tough flexible steel such as that from which hand saws are made, but it may be made from a manganese steel though other material may be used such as horn fiber.

In using the word band or wire in this specification I mean to include any material or device capable of setting up vibrations in the manner herein described.

13 is a revolving wheel or device turning on its axis and preferably made of phosphor bronze or provided with a peripheral surface of phosphor bronze. The wire or band 14, 14' is wrapped around the wheel 13, one or both ends being connected with the diaphragm 11. In Fig. 1, for example, the ends of the band 14, 14' are fastened to the pin 17 which is passed through the diaphragm and secured by the adjustable nut 16.

When the wheel 13 is rotated in such direction as to make 14 the tight end and 14' the loose end, the wheel 13 acts as a rotating snubbing block and pulls the diaphragm 11 to the right until the diaphragm by its

motion to the right slackens the loose end 14' still further, to such an extent that the turns on the wheel 13 slip and the diaphragm returns to its normal position, after which the operation is repeated. This takes place automatically and at a frequency determined by the governing element, and forms a very efficient means of producing reciprocating motion at high frequencies and with a minimum of inertia and power. It is of course immaterial in which direction the wheel 13 rotates when the strip 14, 14' is unincumbered with any attachment.

By "frequency determined by the governing element" I mean a frequency determined by anything in the apparatus which may control or govern in any way the action of the wire 14 including the diaphragm or other spring member and the wheel 13.

The frequency may be determined by the natural period of the diaphragm 11 or of the band or wire 14, 14' which may be weighted. A separate wire 18 stretched between two fixed points 20, 21, and attached to the end 14 by a clamp 19 may be used to determine the frequency of the end 14 while not materially affecting the frequency of the end 14', then by reversing the rotation of the wheel 13 so as to tighten the end 14' and loosen the end 14 a change in frequency will be secured. Such a wire so arranged will tend to govern the natural frequency of the wire 14 when acted upon by the rotary member 13 because it will modify the natural vibrations of the wire 14.

Other means of controlling the frequency of vibration are shown in Fig. 2 where in addition to the diaphragm 11, wheel 13 and band 14, 14' a wheel 25 having projections is caused to rotate so that the projections will come in contact with the band. The rapid engagement of such projections with the band will of course change the tension in the band 14 and so the frictional engagement of the rotary member 13 with the band 14, thus disturbing the normal vibration of the diaphragm which it would have if the wheel 25 were not used, and this is true however the end of the wire 14' is held. In this case the two ends of the band may be connected to the diaphragm as shown in Fig. 1, or one end may be otherwise made fast, for example as shown in Fig. 2 where a tubular electro-magnet 23, 24 is used to

attract an armature 22 which is attached to the end 14', the coil 24 of the electro-magnet being connected to an alternating dynamo or energized by an interrupted current of high frequency, or the current from a telephone transmitter, caused to fluctuate by sounds, which are thereby reproduced by the diaphragm 11. If a direct or uninterrupted current be used, the electro-magnet will serve as an attachment for one end of the strip, so that the end of the band or strip 14' will be held as in a vise or other means of stationary attachment, whereas if current from the alternating dynamo or an interrupted current is used there is again a modification of the natural frequency of the apparatus. By taking into consideration the frequency of the current controlling the electro-magnet 23 the natural period of the diaphragm 11 and, if used, the speed of rotation of the wheel 25, the tone or rate of vibration of the diaphragm 11 can be modified considerably. Any or all of these means may be tuned together so as to be in resonance or two notes, for instance the octave, may be produced in the two ends of the band.

It is to be noted that this method is sharply distinguished from the old method invented by applicant (U. S. application, Serial No. 400,134, filed October 31, 1907), in which a wheel covered with rosin is used, and which depends upon the fact that the coefficient of friction is greater for slowly-moving bodies than for fast, and which principle is utilized in bowing a violin. The present method depends upon the fact that when the wire or band is not in contact merely, but is wrapped around the wheel, the friction increases as a logarithmic function of the angle, and a small pressure or tension applied at the point where the wire leaves the wheel makes a greatly multiplied pressure or tension in the wire at the point where it commences to wind on the wheel. This fact is well known, as in snubbing a steamer to a dock, but its possibilities and advantages with a rotating snubbing block as a means of producing reciprocating motion have never before been discovered or realized or applied when combined with an automatic frequency governing means.

The apparatus may be used for receiving sound waves, as for example by placing a microphone 32 on the diaphragm 11 as shown in Fig. 1, the microphone forming part of a telephonic receiving circuit.

The reciprocating motion may be utilized not only to secure sound vibrations such as will be produced by the above apparatus but also for other purposes. For example, I have shown diagrammatically in Fig. 3 a saw 26 attached to the lever 11' which is pivoted at 31 on the support 27. In this case the end 14 if the band is attached to

the other end of the lever 11' and when the wheel 13 is turned in a direction to wind the end 14, the lower end of the lever 11' will be pulled to the right pulling the saw with it until its arm or pin 25' strikes the spring 29 attached to the support 27. The end 14' of the band is also attached to the spring 29 and when the pin 25' strikes the spring 29 it loosens the turns of the band 14, 14' on the wheel 13 so that the spring 28 retracts the saw. The motion is thus automatic and the stroke can be varied by varying the length of the pin 25'.

Other applications of this invention will suggest themselves.

It is desirable that the wire or band and wheel run in a bath of oil or oil and graphite, though water or water and alkali may be used. Such a bath will reduce the harshness of tone which would result from an actual metal contact.

What I claim as my invention is:—

1. The method of producing vibratory motion of a spring-controlled member which consists in frictionally engaging said member to cause an increasing stress thereon until said stress becomes greater than and overcomes the frictional component when said member will release itself to be frictionally engaged again and automatically governing the periodicity of vibration of said member.

2. In a device of the kind described, the combination with a rotary member turning on its axis, of a wire wrapped around said rotary member, a spring member with which said wire is connected, and an automatic governing element to govern the frequency of vibration of said spring member.

3. In a device of the kind described, the combination with a rotary member turning on its axis, of a wire wrapped around said rotary member, a spring-controlled means to which one end of said wire is connected, and an automatically governing element to govern the frequency of vibration of said spring-member.

4. In a device of the kind described, the combination with a rotary member turning on its axis, of a wire wrapped around said rotary member, a vibratory device mounted in fixed position and to which one end of said wire is connected, and means for automatically governing the periodicity of vibration of said vibratory member.

5. In a device of the kind described, the combination with a rotary member turning on its axis, of a wire wrapped around said rotary member, a vibratory device with which said wire is connected, and means engaging said wire whereby its frequency of vibration may be automatically governed.

6. In a device of the kind described, the combination with a rotary member turning on its axis, of a wire wrapped around said rotary member, a vibratory diaphragm with

which said wire is connected, and means whereby the frequency of vibration of said wire may be automatically governed.

5 7. As a means of producing vibratory motion, the combination with a member to be vibrated, of a rotating member turning on its axis, a wire wrapped around said member and one end of which is connected with said member to be vibrated, and an
10 automatic frequency-governing member with which the other end of said wire is connected.

8. As a means of producing sound, the

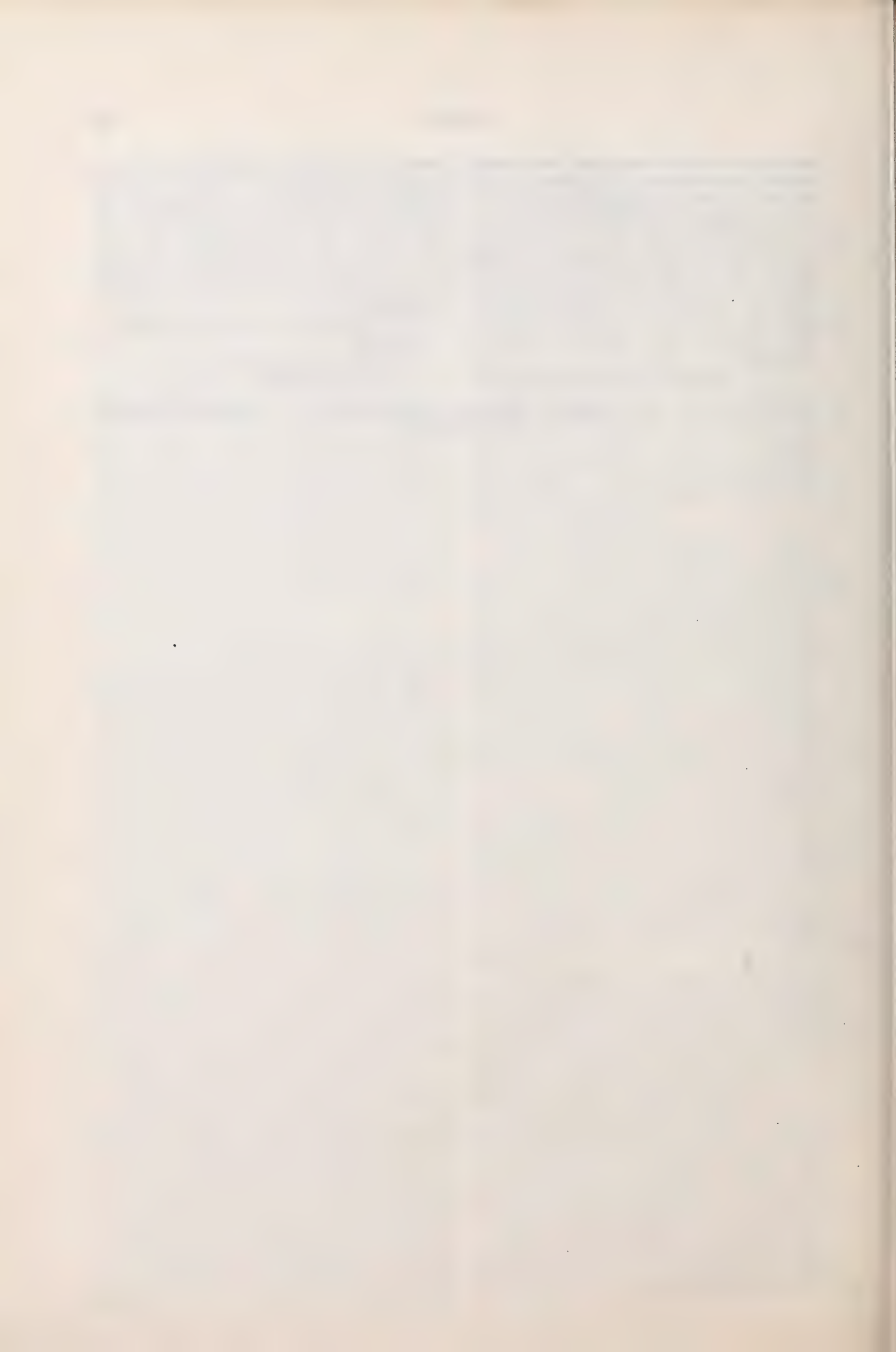
combination with a rotating member turning on its axis, of a vibratory member 15 mounted in fixed position and capable of producing sound, a wire wrapped around said rotating member, one end of said wire being connected to said vibratory member, and an automatic frequency-governing mem- 20 ber with which the other end of said wire is connected.

REGINALD A. FESSENDEN.

Witnesses:

HAROLD J. W. FAY,
EDGAR S. FOSTER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



PHONOGRAPH REPRODUCER,
#1,207,404-----N.H.Holland,
Patented-December 5th, 1916.
Filed-June 30th, 1913.

N. H. HOLLAND.
 PHONOGRAPH REPRODUCER.
 APPLICATION FILED JUNE 30, 1913.

1,207,404.

Patented Dec. 5, 1916.

Fig. 1.

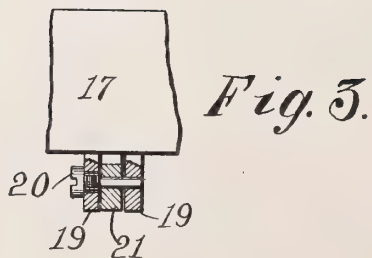
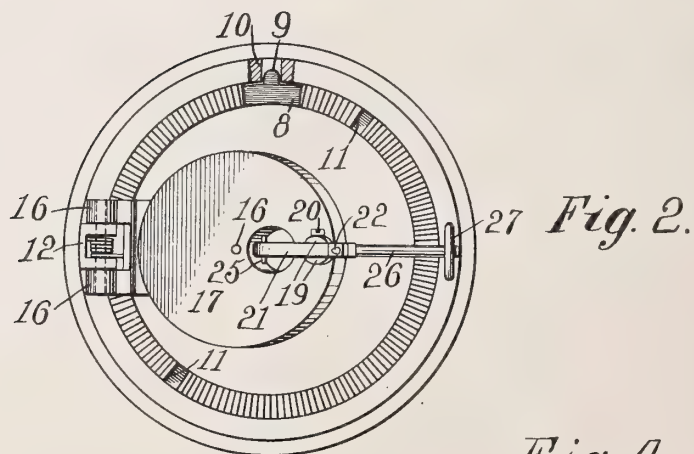
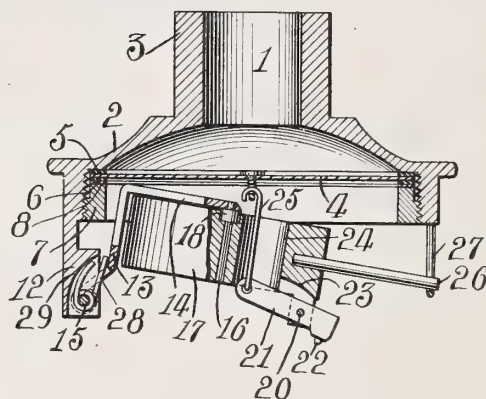
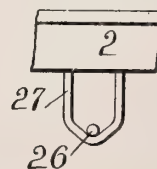


Fig. 4.



WITNESSES
J. A. Propoy
Frederick Pachman

INVENTOR
Newman H. Holland
 BY *Dyer & Holden*
 ATTORNEYS

UNITED STATES PATENT OFFICE.

NEWMAN H. HOLLAND, OF WEST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH-REPRODUCER.

1,207,404.

Specification of Letters Patent.

Patented Dec. 5, 1916.

Application filed June 30, 1913. Serial No. 776,463.

To all whom it may concern:

Be it known that I, NEWMAN H. HOLLAND, a subject of the King of Great Britain, and a resident of West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Reproducers, of which the following is a description.

My invention relates to phonograph reproducers, and more particularly to phonograph reproducers adapted to operate on sound records having record undulations of the up and down or hill and dale type.

The principal object of my invention is the provision of an improved mounting for the stylus lever forming a part of the reproducer whereby the stylus will be capable of tracking the record groove faithfully regardless of the lateral or other irregularities therein. In my improved device, the stylus lever is preferably mounted on a laterally movable floating weight, the inertia and balance of the latter being such that there is practically no tendency, even though the reproducer be jarred, for the stylus to jump from its proper position across the side walls of the record groove. The desired balance is provided for in my invention by shaping the floating weight symmetrically with respect to the axis about which its lateral movement takes place.

Other objects of my invention reside in the improved details of construction and combination of parts hereinafter more fully described and claimed.

In order that my invention may be more clearly understood, reference is hereby made to the accompanying drawing forming a part of the specification and illustrating a preferred form of my invention.

In the drawing—Figure 1 is a central vertical section through a reproducer embodying my invention; Fig. 2 is a bottom plan view thereof; Fig. 3 is a view partly in elevation and partly in section showing the mounting of the stylus lever; and Fig. 4 is an elevation showing a detail of construction.

In all the views like parts are designated by the same reference numerals.

The sound box body 1 of my improved reproducer is provided with the body member 2, which has formed integrally therewith the neck 3, to which the horn or other

sound conveying means may be connected. The diaphragm 4 is mounted between rubber gaskets 5 and 6, the latter being secured against the sound box body by a ring 7 which has a screw threaded connection with the interior of the sound box body and bears against a metallic ring 8 which rests against the gasket 6. The ring 8, as more clearly shown in Fig. 2, is provided with a lip or projection 9 extending within an opening 10 in the sound box body and serving to hold the ring 8 against rotation when the ring 7 is rotated within the sound box body. By the provision of the said ring 8, the possibility of damage to the rubber gasket 6 upon the rotation of the ring 7 is effectively eliminated. The ring 7 is provided with grooves or slots 11 for the reception of a wrench or other suitable means to facilitate the rotation of the ring.

The sound box body is provided with a downwardly extending arm or projection 12 pivotally supporting an L-shaped arm or bracket which is provided with an upwardly extending arm 13 and an arm 14 extending at right angles to the arm 13. The axis of the pivot 15 whereby the L-shaped arm or bracket is supported from the arm 12 extending in a horizontal direction and substantially parallel to the diaphragm 4. The end of the arm 14 most remote from the pivot 15 has secured thereto a downwardly extending stud 16 which serves as a pivot about which the lateral oscillation of the floating weight 17 takes place.

The weight 17 is cylindrical in shape, the longitudinal axis and the axis of symmetry thereof being coincident with the axis of the stud 16. The upper end of the stud 16 is provided with an enlargement 18 extending into a cylindrical groove or recess in the top of the weight 17 and serving to hold said weight spaced from the arm 14 to prevent the frictional engagement of the weight 17 with the arm 14. Weight 17 is provided on its under side with a pair of spaced ears or lugs 19, preferably formed integral with the said weight, through which ears extends the pivot pin 20 in which is pivotally mounted the stylus lever 21 carrying near its forward end the stylus 22. The axis of the pivot 20 is preferably located near the front of the weight 17 and, therefore, a distance from the axis of the stud 16 to insure the free lateral

movement of the stylus 22. As more clearly shown in Fig. 3, the pivot pin 20 has a portion threaded into one of the ears or lugs 19. The weight 17 is preferably provided with a groove 23 immediately above the stylus lever so that the stylus lever may be pivoted close to the under surface of the weight without interfering with the vertical oscillation of the said lever. The weight 17 is provided with an opening or passage 24 below the center of the diaphragm and in front of the stud 16, the stylus lever 21 being connected to the diaphragm by a link 25 extending through the opening 24. The pivoting means comprising the L-shaped bracket 13, 14 and the stud 16 are of very small weight relatively to the weight 17 and the downward pressure of the latter on the stylus is accordingly far in excess of that due to the said pivoting means. The pivoting means may weigh about 1.5 grams and the weight about 18 grams.

It will be seen that the weight 17 is not supported by the pivoting means 13, 14 and 16 and is movable longitudinally or axially of the stud 16; and in order to prevent displacement of the said weight from the said stud and also to limit the downward movement of the said weight upon the disengagement of the reproducer from a record, a pin 26 is secured in the weight 17 and is confined within the stirrup or loop 27 secured to and extending downwardly from the sound box body. Referring to Fig. 4, it will be seen that the lower portion of the loop 27 is in the shape of a vertical V; so that upon the disengagement of the reproducer from the record, the projection 26 is guided by the loop to a position in the vertical center line of the loop, and the weight 17 and the stylus lever carried thereby are effectively centered.

In operation, the weight 17 should always bear up against the enlargement 18 on the stud 16. In order to assist in maintaining the weight in this position with respect to the stud, I preferably employ a spring 28 tending to press the L-shaped bracket 13, 14 downwardly toward the weight. One end of this spring bears against the wall of the recess 29 in the arm 12, the other end pressing downwardly on the arm 13. In addition to its function of maintaining the weight 17 and stud 16 in proper relative axial positions, the spring 28 serves to increase the downward pressure on the floating weight and the stylus.

With the construction described above, it is to be noted that the floating weight moves freely upwardly and downwardly about the axis of pivot 15, allowing the stylus to freely follow the up and down variations or eccentricities of the record surface, the said weight also being movable laterally about the axis of stud 16 so as to permit great freedom in the movement of the stylus trans-

versely to the record groove. The construction and mounting of the floating weight provide a well balanced mounting for the stylus lever insuring an accurate tracking of the record groove by the latter. The device herein disclosed is also of simple construction and may be easily assembled.

It will be understood that my invention is not limited to the precise details and construction shown but may be varied within the scope of the appended claims without departing from the spirit of my invention.

Having now described my invention what I claim as new and desire to protect by Letters Patent is as follows:

1. In a device of the class described, the combination of vibratory means, a symmetrical weight, means for pivoting said weight for movement about an axis parallel to said vibratory means and also for lateral oscillation about its axis of symmetry, a stylus lever supported by said weight and connected with said vibratory means, and a stylus carried by said lever, the pivot of said lever being spaced from the axis of symmetry of said weight and being located between said stylus and said axis of symmetry, substantially as described.

2. In a device of the class described, the combination of vibratory means, a symmetrical weight, means for pivoting said weight for movement about an axis parallel to said vibratory means and also for lateral oscillation about its axis of symmetry, resilient means for maintaining said pivoting means and said weight in proper relative position, a stylus lever supported by said weight and connected with said vibratory means, and a stylus carried by said lever, the pivot of said lever being spaced from the axis of symmetry of said weight and being located between said stylus and said axis of symmetry, substantially as described.

3. In a device of the class described, the combination of vibratory means, a symmetrical weight, means for pivoting said weight for movement about an axis parallel with said vibratory means and also for lateral oscillation about its axis of symmetry, a stylus lever supported by said weight, and means arranged at the side of said axis of symmetry and connecting said stylus lever to said vibratory means, substantially as described.

4. In a device of the class described, the combination of vibratory means, a symmetrical weight, means for pivoting said weight for movement about an axis parallel to said vibratory means, and also for lateral oscillation about its axis of symmetry, said means permitting movement of said weight along its said axis of symmetry, a stylus lever supported by said weight, and means connecting said stylus lever to said vibratory means, substantially as described.

5. In a device of the class described, the combination of vibratory means, a symmetrical weight, means for pivoting said weight for movement about an axis parallel to said
5 vibratory means and also for lateral oscillation about its axis of symmetry, said means permitting movement of said weight along its said axis of symmetry, resilient means tending to maintain said pivoting means and
10 said weight in proper relative positions, a stylus lever supported by said weight, and means connecting said stylus lever to said vibratory means, substantially as described.

6. In a device of the class described, the combination of vibratory means, a symmetrical weight, means for pivoting said weight for movement about an axis parallel
15 to said vibratory means and also for lateral oscillation about its axis of symmetry, said weight being movable downwardly with respect to said pivoting means, resilient means exerting a downward pressure on said pivot-

ing means to hold the same in operative relation to said weight, and a stylus lever supported by said weight and connected with
25 said vibratory means, substantially as described.

7. In a device of the class described, the combination of vibratory means, a symmetrical weight, means for pivoting said weight
30 for movement about an axis parallel with said vibratory means and also for lateral oscillation about its axis of symmetry, the weight of said pivoting means being less than that of said symmetrical weight, a
35 stylus lever supported by said weight, and means connecting said stylus lever to said vibratory means, substantially as described.

This specification signed and witnessed this 27th day of June, 1913.

NEWMAN H. HOLLAND.

Witnesses:

FREDERICK BACHMANN,
MARY J. LAIDLAW.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

AUTOMATIC STOP FOR SOUND REPRODUCING
MACHINES,

#1,207,589-----R.O. May,

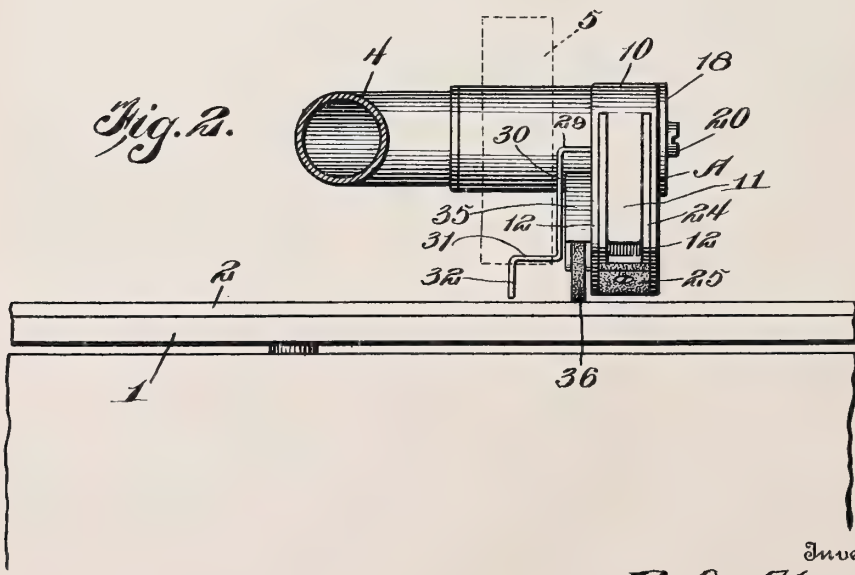
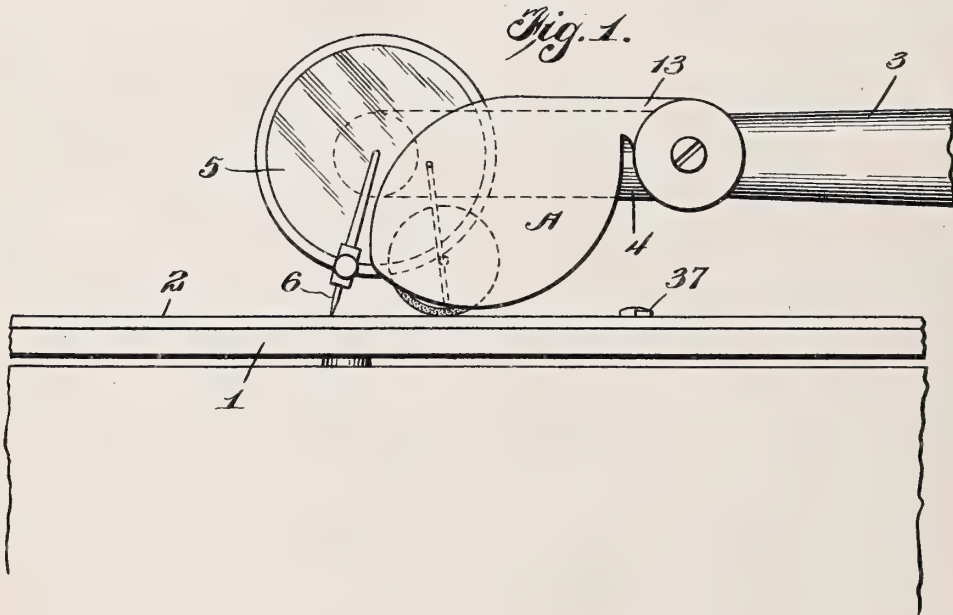
Patented-Dec. 5th, 1916.

Filed-February 23rd, 1916.

R. O. MAY.
 AUTOMATIC STOP FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED FEB. 23, 1916.

1,207,589.

Patented Dec. 5, 1916.
 3 SHEETS—SHEET 1.



Witnesses

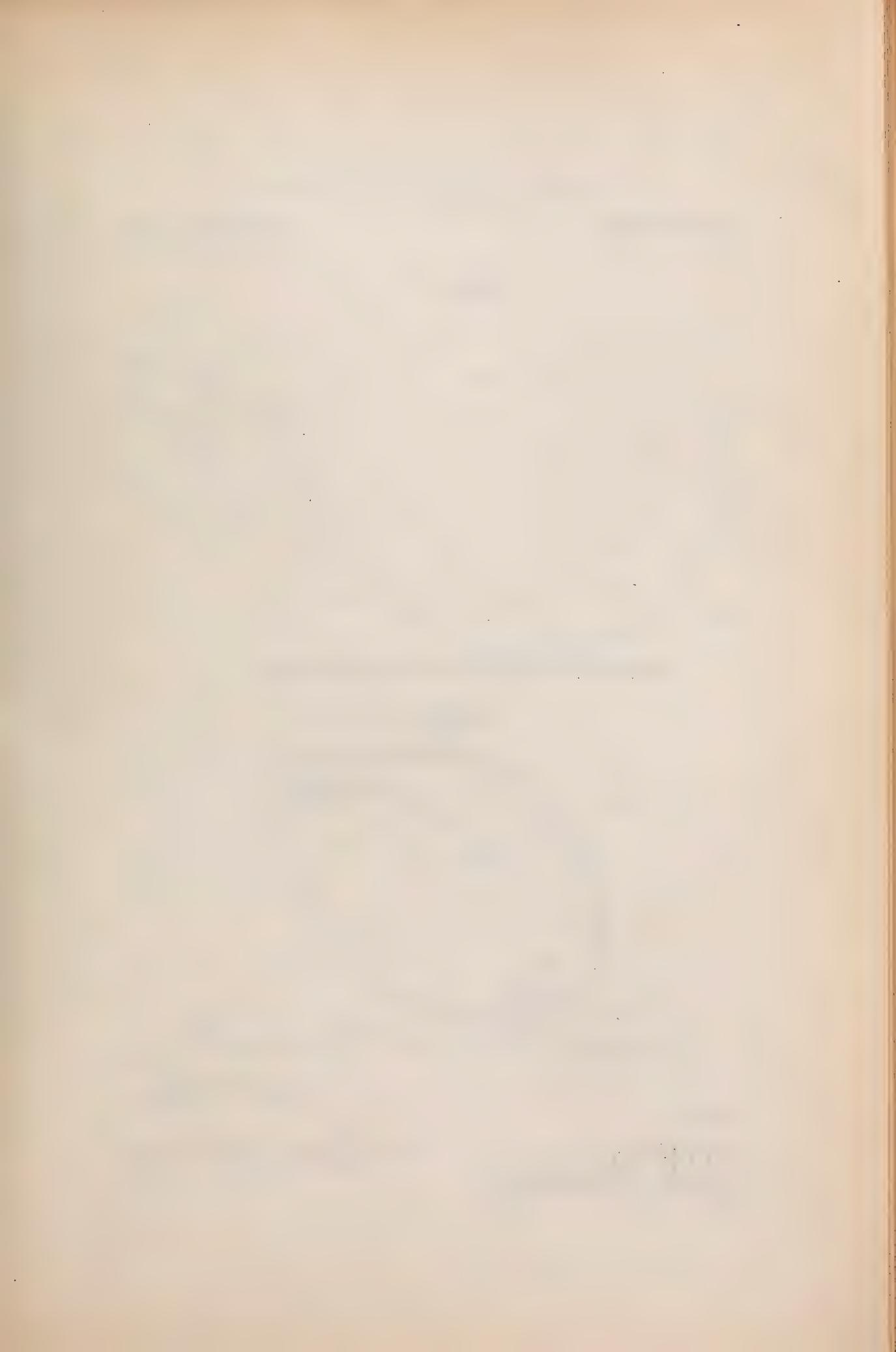
L. S. Heinrichs
John J. McCarthy

By

R. O. May
Victor J. Evans

Inventor

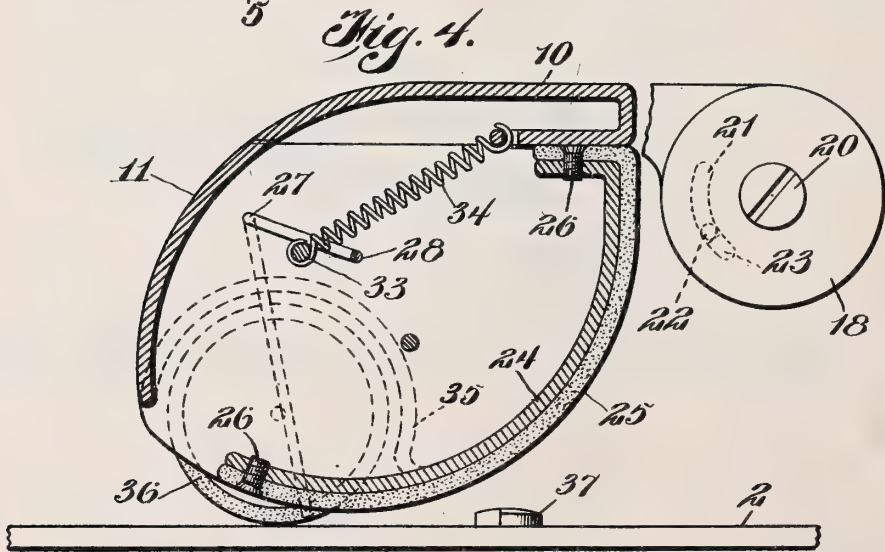
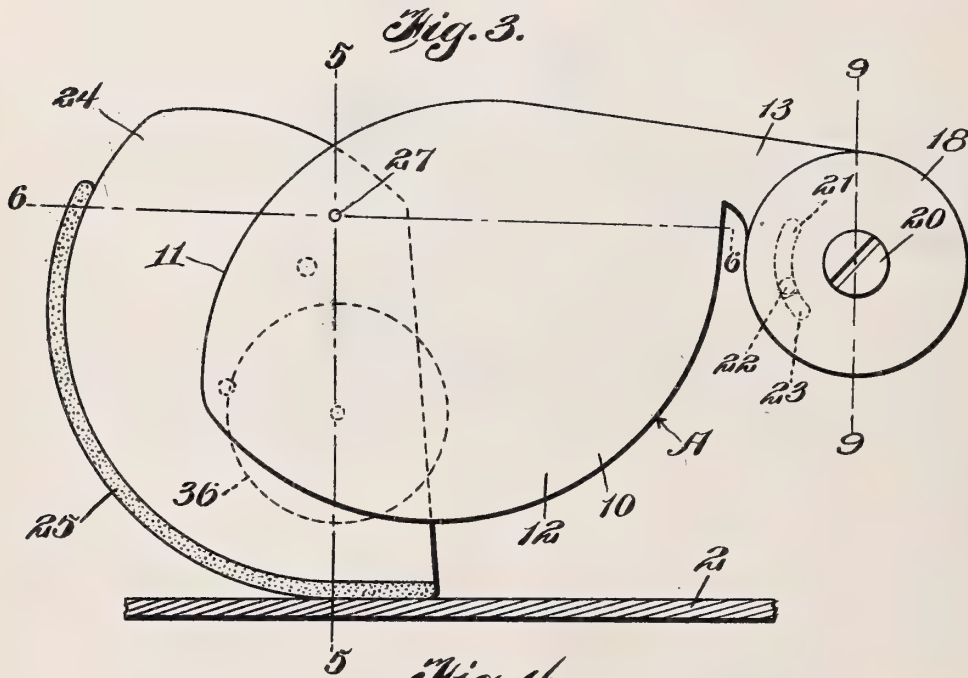
Attorney



R. O. MAY.
 AUTOMATIC STOP FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED FEB. 23, 1916.

1,207,589.

Patented Dec. 5, 1916.
 3 SHEETS—SHEET 2.



Witnesses

L. R. Herricks
John J. McCarthy

Inventor
R. O. May

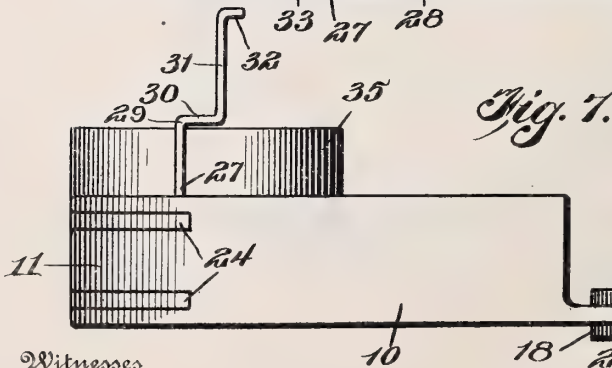
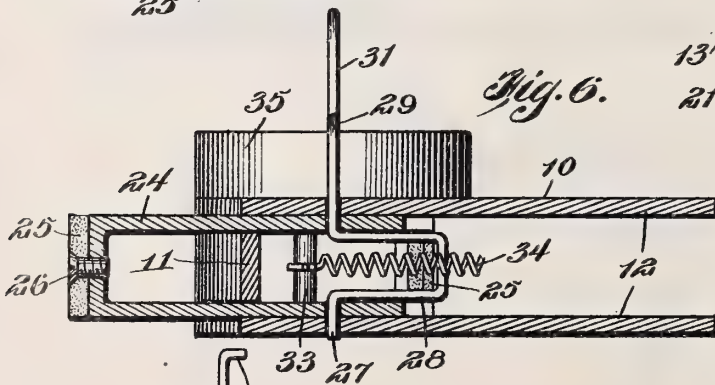
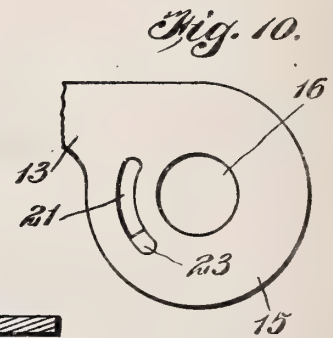
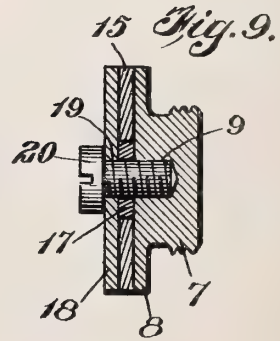
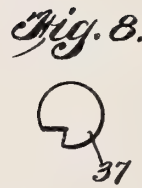
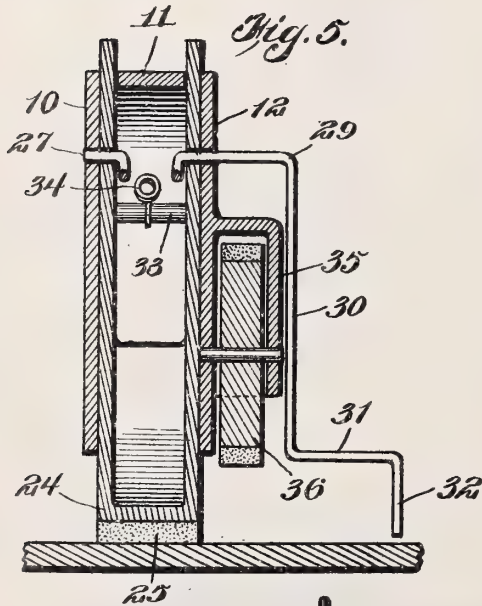
By *Victor J. Evans*
 Attorney



R. O. MAY.
 AUTOMATIC STOP FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED FEB. 23, 1916.

1,207,589.

Patented Dec. 5, 1916.
 3 SHEETS—SHEET 3.



Witnesses

L. R. Heinrichs
 John J. McCarty

Inventor
 R. O. May
 By Victor J. Evans
 Attorney

UNITED STATES PATENT OFFICE.

RALPH OLIVER MAY, OF SALEM, INDIANA.

AUTOMATIC STOP FOR SOUND-REPRODUCING MACHINES.

1,207,589.

Specification of Letters Patent.

Patented Dec. 5, 1916.

Application filed February 23, 1916. Serial No. 79,979.

To all whom it may concern:

Be it known that I, RALPH O. MAY, a citizen of the United States, residing at Salem, in the county of Washington and State of Indiana, have invented new and useful Improvements in Automatic Stops for Sound-Reproducing Machines, of which the following is a specification.

This invention relates to improvements in automatic stop devices for sound reproducing machines and has particular application to an automatic stop for use in connection with the talking machines of the disk type.

In carrying out the present invention, it is my purpose to provide an automatic stop for disk talking machines whereby the reproducer will be lifted to disengage the needle from the record and the motor stopped at the end of the selection being played on the machine.

It is also my purpose to provide a device of the class described which will be carried by the goose neck on the tone arm and which will follow the needle and reproducer across the record when a selection is being played and which will be so constructed as to support itself upon the record when following the needle and reproducer.

Another object of my invention is to provide an automatic stop of the type set forth, which will be constructed in such manner as to reduce the friction between the stop device and the record, when the device is in use, to a minimum so that the record may rotate at its usual speed and without placing additional strain on the motor of the talking machine.

With the above and other objects in view, the invention consists in the construction, combination and arrangement of parts hereinafter set forth in and falling within the scope of the claims.

In the accompanying drawings; Figure 1 is a fragmentary side elevation of a talking machine equipped with an automatic stop constructed in accordance with the present invention. Fig. 2 is a fragmentary cross sectional view therethrough showing the stop device in front elevation. Fig. 3 is an enlarged side elevation of the stop device, the record of the talking machine being shown in section. Fig. 4 is a longitudinal sectional view through the device showing the parts in the position they occupy when the device is traveling across the record with the reproducer. Fig. 5 is a cross sectional view

through the stop device on the line 5—5 of Fig. 3. Fig. 6 is a horizontal sectional view on the line 6—6 of Fig. 3. Fig. 7 is a plan view of the record controlled member. Fig. 8 is a similar view of the button carried by the record. Fig. 9 is a cross sectional view on the line 9—9 of Fig. 3. Fig. 10 is a sectional view taken at right angles to Fig. 9 showing a portion of the device in elevation.

Referring now to the drawings in detail, 1 designates the turn table of a talking machine, 2 a record on such table and 3 the tone arm to which is pivotally connected the usual goose neck 4 carrying the reproducer 5 equipped with a needle 6 engaging in the sound grooves in the record so that the selection may be reproduced.

My improved safety device is indicated as an entirety by the letter A and, in the present instance, comprises a stud 7 adapted to be threaded into one end of the goose neck in lieu of the usual set screw. Formed on the outer end of the stud 7 is a flat head 8 and formed centrally of the head 8 and the stud is a recess 9.

10 designates a casing comprising a curved top wall 11 and segmental side walls 12 depending from the side edges of the curved top wall and spaced apart in parallelism. One of the side walls 12 at the upper end thereof is formed with an outwardly projecting arm 13 and formed on the outer end of the arm 13 is a disk 15. This disk 15 is placed face to face with the head 8 on the stud 7, while formed in the center of the disk 15 is an opening 16 in which is mounted a relatively thick bushing 17. Arranged face to face with the other face of the disk 15 is a plate 18 and formed in the plate 18 is an opening 19 registering with the opening in the bushing 17 and the recess 9 and passed through the opening 19 and the bushing and threaded into the recess is a securing stud 20 whereby the plate 18 may be clamped against the bushing and the bushing forced against the head 8. Owing to the bushing being relatively thick as compared with the disk 15, the latter may rotate freely between the head 8 and the plate 18. Formed in the disk 15 at a point below the arm 13 is a curved slot 21, while secured to the inner face of the plate 18 and projecting into the slot 21 is a pin 22 and secured within the slot 21 at the lower end thereof is a cushion 23 formed of rubber or other suitable material which acts to eliminate shock or jar when the disk 15 is

rotated about the securing stud 20 and the cushion engaged with the pin 22.

Mounted within the casing 10 and disposed between the side walls 12 thereof is a cam 24 and overlying the edge of the cam contiguous to the lower edges of the walls 12 is a pad 25 fastened to the cam by means of screws 26 or other suitable fastening devices and adapted to engage the upper surface of the record. In the present instance, the edges of the cam contiguous to the top edges of the walls 12 are open and passed through alining openings formed in the walls 12 and the sides of the cam adjacent to the upper portion of the cam is a shaft 27 having the portion thereof within the cam formed with a crank 28 and the end portion adjacent to the center of the turn table offset as at 29 and then projected downwardly as at 30 toward the turn table, then outwardly as at 31 toward the center of the turn table and downwardly as at 32. This downwardly projecting portion 32 constitutes a trip arm and terminates contiguous to the upper surface of the record on the turn table. Extending across the interior of the cam at a point adjacent to the shaft 27 and disposed in the path of movement of the crank portion 28 is a shaft 33 and fastened to the pin 33 is one end of a coiled retractile spring 34, the other end of such spring being fastened to the curved wall 11 of the casing 10. Fast upon the side wall 12 of the casing facing the center of the turn table is a partially circular housing 35 and rotatably mounted in this housing 35 is a bearing wheel 36 having the periphery thereof covered with felt or other soft material and projecting below the side wall of the casing and adapted to ride over the record as the selection thereon is being played. Suitably secured to the playing surface of the record adjacent to the center thereof is a button 37.

In practice, the spring 34 holds the cam 24 normally within the confines of the walls of the casing and when a selection is to be played the needle is placed in the sound groove in the usual manner and the periphery of the roller 36 engaged with the record outside of the needle. In the playing of the selection, the needle traverses the sound groove and the stopping device follows the needle and the reproducer owing to the connection between the stopping device and the goose neck. When the needle reaches the last sound groove succeeding the playing of the selection, the trip arm 32 engages the button 37 and in the continued rotation of the record the shaft 27 is rocked, thereby engaging the crank portion with the pin 33 and swinging the outer edge of the cam into engagement with the record against the action of the spring 34. As the record continues to revolve the cam is drawn out of

the casing and in the outward movement of the cam the casing and arm 13 are elevated, thereby rotating the disk 15. Upon the rotation of the disk 15 the cushion 23 engages the pin 22 in the plate 18 with the effect to rotate the goose neck to elevate the reproducer on the stylus, thereby disengaging the stylus from the record. Owing to the friction set up between the record and the outer arm 32 lengthened so as to engage in the depression is automatically lifted out of engagement with the record and the motor stopped after the selection has been played. If desired, the record may be formed with a depression in lieu of the button and the trip arms 32 lengthened so as to engage in the depression. By means of the loose connection between the disk 15 and the goose neck the frame carrying the cam and associated parts may adjust itself to needles of various lengths.

While I have herein shown and described the preferred form of my invention by way of illustration, I wish it to be understood that I do not limit or confine myself to the precise details of construction herein described and delineated, as modification and variation may be made within the scope of the claims and without departing from the spirit of the invention.

I claim:

1. In an automatic stop for sound reproducing machines of the disk type, the combination with the goose neck of the tone arm, of a frame, a loose connection between said frame and the goose neck whereby the frame may adapt itself to needles of various lengths, means supporting said frame upon the record, a cam carried by said frame and normally out of engagement with the record, and record controlled means for swinging said cam downwardly into engagement with the record whereby the cam will be acted upon to elevate said frame and goose neck and bear upon the record to lift the needle out of engagement with the record and stop the rotation of the record.

2. In an automatic stop for sound reproducing machines of the disk type, the combination with the goose neck of the tone arm, of a frame, a loose connection between said frame and the goose neck whereby the frame may adapt itself to needles of various lengths, means supporting said frame upon the record, a cam carried by said frame and normally out of engagement with the record, record controlled means for swinging said cam downwardly into engagement with the record whereby the cam will be acted upon to elevate said frame and goose neck and bear upon the record to lift the needle out of engagement with the record and stop the rotation of the record, and a spring holding said cam normally in said frame.

3. In an automatic stop for sound repro-

ducing machines, the combination with the
goose neck of the tone arm, of a frame, a
loose connection between said frame and the
goose neck whereby the frame may adapt
5 itself to needles of various lengths, means
carried by said frame and normally out of
engagement with the record, and capable of
movement to engage the record to stop the
rotation of the latter and elevate said frame,
10 and means for actuating said means into en-
gagement with the record whereby said first

means will act to elevate said frame and
goose neck and bear upon the record to ele-
vate the needle out of engagement with the
record and stop the rotation of the record. 15

In testimony whereof I affix my signature
in presence of two witnesses.

RALPH OLIVER MAY.

Witnesses:

WILLIAM OVERMAN,
JAMES W. MAY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

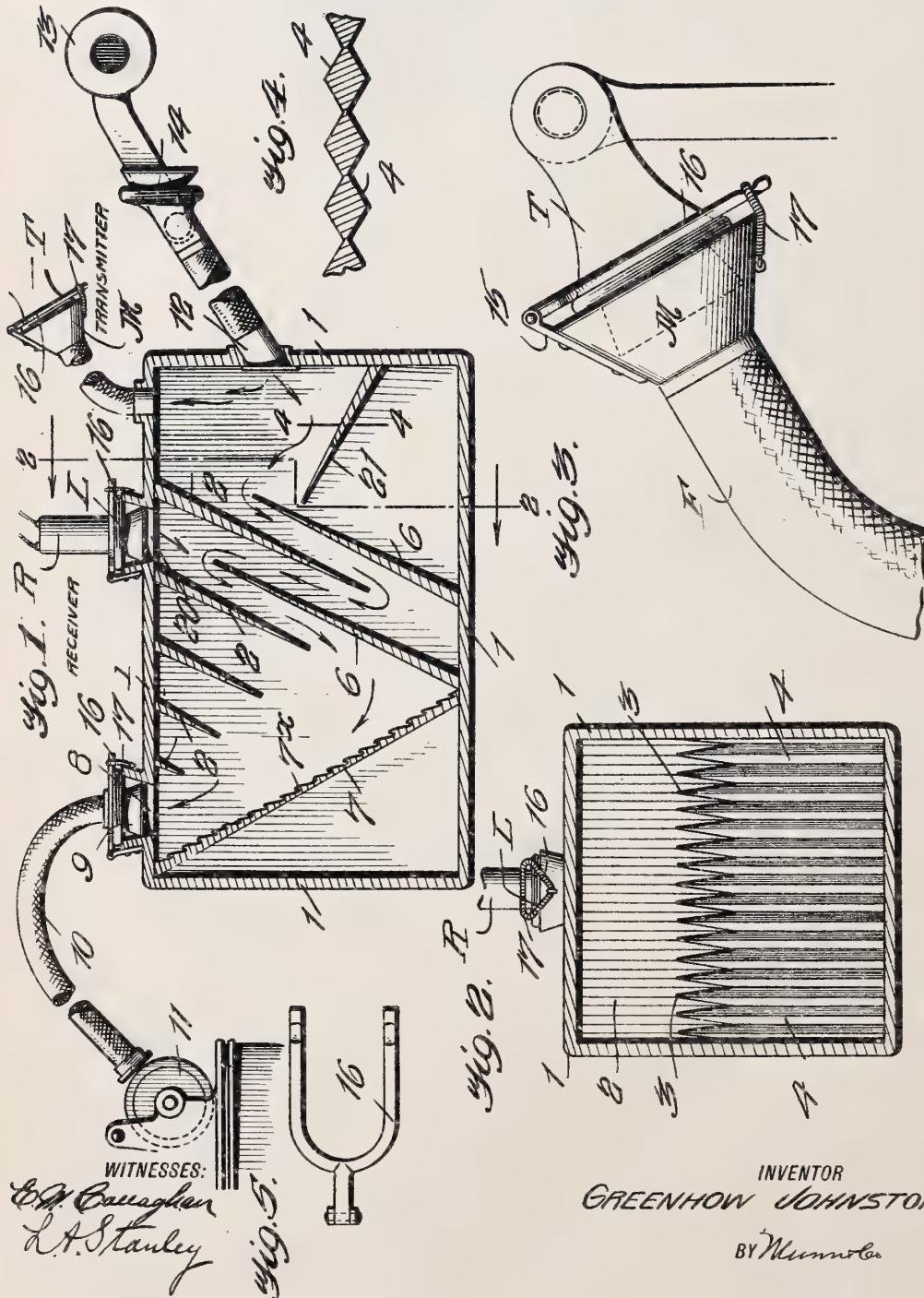


DEVICE FOR RECORDING
TELEPHONE CONVERSATIONS,
#1,207,685-----G. Johnston,
Patented-December 5th, 1916.
Filed-December 14th, 1915.

G. JOHNSTON.
 DEVICE FOR RECORDING TELEPHONE CONVERSATIONS.
 APPLICATION FILED DEC. 14, 1915.

1,207,685.

Patented Dec. 5, 1916.



UNITED STATES PATENT OFFICE.

GREENHOW JOHNSTON, OF RICHMOND, VIRGINIA, ASSIGNOR OF ONE-HALF TO JAMES W. GRAVES, OF RICHMOND, VIRGINIA.

DEVICE FOR RECORDING TELEPHONE CONVERSATIONS.

1,207,685.

Specification of Letters Patent.

Patented Dec. 5, 1916.

Application filed December 14, 1915. Serial No. 66,772.

To all whom it may concern:

Be it known that I, GREENHOW JOHNSTON, a citizen of the United States, and a resident of Richmond, in the county of Henrico and State of Virginia, have invented a certain new and useful Improvement in Devices for Recording Telephone Conversations, of which the following is a specification.

My invention relates to improvements in devices for recording telephone conversations, and it consists in the combinations, constructions, and arrangements herein described and claimed.

An object of my invention is to provide a device which may be used in connection with an ordinary telephone, such as a desk telephone, and an ordinary phonograph of the cylinder type, for recording the entire conversation between two parties who are using the telephone.

A further object of my invention is to provide a device of the type described in which the spoken sounds and those produced by the vibration of the diaphragm of the receiver of the telephone are amplified or intensified so as to produce recordable impressions on the phonograph cylinder through the medium of the ordinary phonograph needle.

A further object of my invention is to provide a sound amplifying device, the interior of which is provided with a series of members adapted to vibrate in such a way as to reinforce the sound waves and to cause a louder and more intense sound.

A further object of my invention is to provide a device having a sound amplifier which is of a simple nature and is comparatively cheap to manufacture and which amply fulfils the purpose intended.

Other objects and advantages will appear in the following specification, and the novel features of the invention well be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings, forming a part of this application, and in which—

Figure 1 is a sectional view through the sound amplifying box, the other parts of

the apparatus being shown in elevation. Fig. 2 is a section along the line 2—2 of Fig. 1. Fig. 3 is a side view of the means for connecting the telephone transmitter with the sound amplifying casing. Fig. 4 is a section along the line 4—4 of Fig. 1. Fig. 5 is a plan view of a portion of the clamping mechanism for connecting the receiver, transmitter, and phonograph to the sounding box.

In carrying out my invention I make use of a sounding box or sound amplifier. This consists of an outer casing 1 made preferably entirely of wood and put together without nails or metal of any kind. This may be accomplished in one or more ways, as for instance by using glue or by dovetailing, or by the use of pins, etc., not shown.

Disposed in the interior of the casing 1 and extending downwardly and toward one end, is a series of vibratory members which are in the nature of partitions. These vibratory members are shown at 2 in Fig. 1 and it will be noted that they are thicker at their bases where they join the casing 1 and taper off to an edge. It will also be observed that these members 2 have teeth 3 and furthermore that the members are corrugated as shown at 4 in Fig. 4, on both sides of the vibratory members. These vibratory members are also secured to the casing 1 without the use of nails or metal. As will be observed from Fig. 1, the vibratory members 2 increase in length and size from one portion of the sound box to another.

Extending upwardly and being inclined in the opposite direction from that of the first mentioned vibratory members, are additional vibratory members 6. As will be seen from Fig. 1, these members are substantially parallel with the first mentioned vibratory members. They are, however, of the same nature and tend to make a circuitous path for the sound vibrations.

Near one end of the box on the interior thereof, is a deflecting partition which, as will be observed, is thinner at the center than at the ends. This partition 7 is in fact a diaphragm. The upper surface of

the diaphragm is provided with a series of transverse ridges 7* which tend to deflect sound upwardly toward the opening 8 in the casing 1 at which opening the mouth-
 5 piece 9 of the tube 10 leading to the phonograph 11 is secured. The opposite end of the casing 1 has a sound pipe 12 which is provided with an ear piece 13 and with a
 10 mouthpiece 14, both the earpiece and the mouthpiece being connected with the interior of the pipe 12 which, as seen from Fig. 1, communicates with the interior of the casing 1.

The telephone transmitter T is secured
 15 to the mouthpiece M of a flexible tube F. The latter communicates with the interior of the casing 1 at its top. In Fig. 3 I have shown the means which is preferably used for securing the tube to the transmitter,
 20 but it will be understood that any suitable means might be used without departing from the spirit of the invention.

The means shown in Fig. 3 consists of a bracket 15 secured to the mouthpiece M of
 25 the tube F, while a yoke 16 is arranged to straddle the transmitter body T, the ends of the yoke 16 being secured by means of a spring 17 or in any other suitable manner. Similar means is used to hold the telephone
 30 receiver and the phonograph mouthpiece in position to be in communication with the interior of the box 1.

From the foregoing description of the various parts of the device, the operation
 35 thereof may be readily understood.

Let us assume that the subscriber has a desk telephone, and that the recording device consists of a sounding box having connections with the telephone set as well as
 40 with a phonograph. Normally the telephone receiver is on the hook and central is called and connection is secured in the ordinary manner. While the operator is making the connection the receiver R is placed
 45 in position over the opening 20 in the casing 1 and is clamped by means of a locking device which I have denoted in general by L but which may be in fact the same as that already described in connection with Fig. 3.
 50 The tube F is connected to the transmitter in a similar manner. Now when the party answers, the operator may start the phonograph going in any suitable manner. This is usually done by a foot switch, but the means for doing it form no part of this present invention and therefore are not shown.
 55 When the party at the calling end of the line, *i. e.*, at that end at which we have assumed the recording apparatus to be situated, talks into the mouthpiece 14, the sound is carried into the interior of the sound intensifying box 1 and is there amplified by the vibrations produced in the vibratory members 2, 6, and 21, the latter being
 60 similar in construction to the vibratory

members 6 and 2. The sound passes in the direction indicated by the arrows and is deflected by the partition or diaphragm 7 toward the mouthpiece 9 of the tube 10 leading to the phonograph 11 where the sound is
 70 recorded. At the same time the sound vibrations pass through the tube F and the transmitter T, and are thence transmitted over the line to the called party. The replies of the called party are received in the
 75 receiver R. Part of the sound vibrations therein produced pass toward one end of the box to which the phonograph is connected, and part pass to the other end of the box through the pipe 12 to the earpiece 13. In
 80 each instance, and especially in the transmission of the sound to the phonograph, the sound is amplified to a considerable extent by the vibrations which are set up in the vibratory members 2, 6, 21 and 7. When
 85 the conversation is ended, the receiver R may be restored to its place on the hook and the tube F may be removed from the transmitter. The complete record of the conversation will then be upon the cylinder of
 90 the phonograph 11.

The making of teeth on the vibratory members 2, 6, and 21 and the corrugations of the diaphragm 7, together with the fact that the diaphragm is constructed with a
 95 comparatively thin central portion, tends to make these parts exceedingly sensitive to sound vibrations so as to act in sympathy with the sound waves and thereby, by supplementing these waves, add to their intensity and hence to the loudness of sound.
 100

I claim:—

1. The herein described apparatus for recording telephone conversations, which consists of a sound amplifying box, a mouth-
 105 piece connected with said box, a phonograph having connection with the interior of the box for receiving sounds from the box, and a transmitter also having connections with the box for receiving sounds from the box.
 110

2. The herein described apparatus for recording telephone conversations, which consists of a sound amplifying box, a mouth-
 115 piece connected with said box, a phonograph having connection with the interior of the box for receiving sounds from the box, a transmitter also having connection with the box for receiving sounds from the box, and a telephone receiver having its diaphragm in communication with the interior of the
 120 box.

3. The herein described apparatus for recording telephone conversations, which consists of a sound amplifying box, a mouth-
 125 piece connected with said box, a phonograph having connection with the interior of the box for receiving sounds from the box, a transmitter also having connection with the box for receiving sounds from the box, a telephone receiver having its diaphragm in
 130

communication with the interior of the box, and an ear-piece having communication with the interior of the box.

4. The combination with a phonograph, and a telephone having a receiver and transmitter, of a sound amplifying box or casing, separate means for connecting the transmitter with the telephone, the receiver of the telephone and the phonograph with the interior of the sound amplifying box or casing, a mouthpiece, an earpiece, and a common sound tube for connecting said mouthpiece and said earpiece with the interior of said sounding box.

5. In a device for recording telephonic conversations, the combination with a phonograph and a telephone having a receiver and a transmitter, of a sound amplifying box, separate means for detachably connecting the transmitter of the telephone, the receiver of the telephone, and the phonograph with the interior of the casing, a mouthpiece, an earpiece, and means for establishing communication between said mouthpiece and said earpiece and the interior of said sound amplifying box.

6. In a device for recording telephonic conversations, a sound amplifying box, a plurality of vibratory members on the inside of the box, a phonograph, means for connecting the phonograph with the interior of said sound amplifying box, a telephone receiver, means for connecting said telephone receiver to the interior of the box, a telephone transmitter, means for connecting said telephone transmitter with the interior of the box, a mouth piece and an earpiece, and means for connecting said mouthpiece and said earpiece with the interior of the box.

7. In a device for recording telephonic conversations, a sound amplifying box, a plurality of vibratory members carried by the walls of the box, means for transmitting sounds from the exterior into said box, and a deflecting diaphragm disposed at one end of said box.

8. In a device for recording telephonic conversations, a casing, a series of vibratory members secured to a wall of the casing and extending inwardly, a second series secured to the opposite wall and extending in the opposite direction, the members of one series alternating with the members of the other series whereby a circuitous path for the sound waves is effected.

9. In a device for recording telephonic conversations, a casing, a plurality of substantially parallel vibratory members rigidly secured to said casing at their bases and extending inwardly into said casing, the ends of said vibratory members being tapered, and said vibratory members being progressively longer from one end of the series to the other.

10. In a device for recording telephonic conversations, a casing, a plurality of substantially parallel vibratory members rigidly secured to said casing at their bases and extending inwardly into said casing, the ends of said vibratory members being tapered and said vibratory members being progressively longer from one end of the series to the other, and each of said vibratory members being provided with a series of teeth.

11. In a device for recording telephonic conversations, a casing, a series of vibratory members secured to a wall of the casing, each of said vibratory members comprising a plate having a broad base adjacent to the wall and tapered toward its opposite end, the opposite sides of each of said plates being corrugated, and each of said plates bearing teeth at their tapered ends.

12. In a device for recording telephonic conversations, a casing, a series of vibratory members secured to a wall of the casing, each of said vibratory members comprising a plate having a broad base adjacent to the wall and tapered toward its opposite end, the opposite sides of each of said plates being corrugated and each of said plates bearing teeth at their tapered ends, said plates being substantially parallel and varying progressively in size from one end of the series to the other.

13. In a device for recording telephonic conversations, a casing, a series of vibratory members secured to a wall of the casing, each of said vibratory members comprising a plate having a broad base adjacent to the wall and tapered toward its opposite end, the opposite sides of each of said plates being corrugated and each of said plates bearing teeth at their tapered ends, said plates being substantially parallel and varying progressively in size from one end of the series to the other, and a second series of vibratory plates extending from the opposite wall and alternating with those of the first series whereby a circuitous path is effected for the sound waves.

14. In a device for recording telephonic conversations, a casing, a series of vibratory members secured to a wall of the casing, each of said vibratory members comprising a plate having a broad base adjacent to the wall and tapered toward its opposite end, the opposite sides of each of said plates being corrugated and each of said plates bearing teeth at their tapered ends, said plates being substantially parallel and varying progressively in size from one end of the series to the other, a second series of vibratory plates extending from the opposite wall and alternating with those of the first series whereby a circuitous path is effected for the sound waves, and a diaphragm having corrugations on one side, said diaphragm being disposed transversely

of the first named vibratory members and spaced apart from the ends of the latter.

15. In a device for recording telephonic conversations, a sound amplifying box, a phonograph, a telephone having a receiver and a transmitter, separate means for connecting the phonograph, the receiver, and the transmitter with the interior of the sounding box for transmitting sounds, and means for transmitting sounds from the exterior of said box into the interior thereof and for transmitting sounds from the interior of the box to the exterior thereof. 10

GREENHOW JOHNSTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

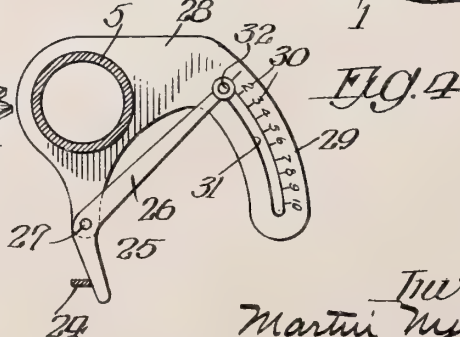
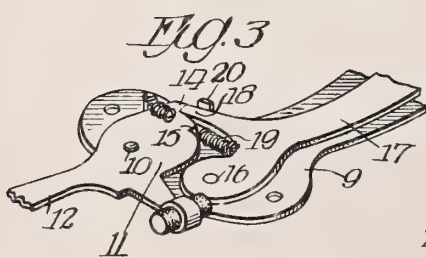
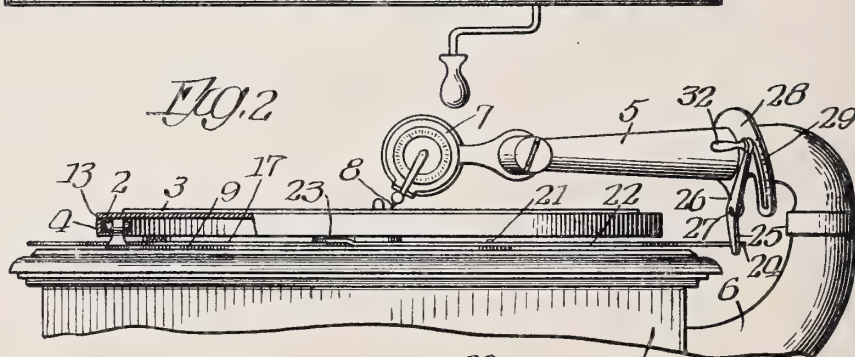
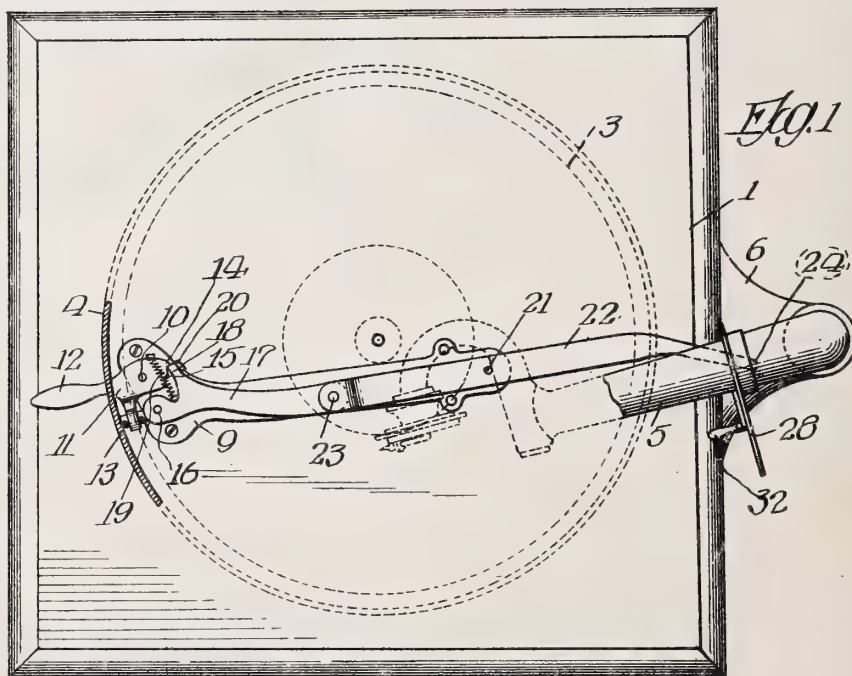
BRAKE MECHANISM FOR TALKING
MACHINES,

#1,207,986-----M. Nystrom,
Patented-Dec.12th,1916.
Filed-May 20th, 1916.

M. NYSTROM.
BRAKE MECHANISM FOR TALKING MACHINES.
APPLICATION FILED MAY 20, 1916.

1,207,986.

Patented Dec. 12, 1916.



Witnesses:
Edw. Barrett
Ernest H. Merchant.

Inventor
Martin Nystrom
By Wm. B. Selys

UNITED STATES PATENT OFFICE.

MARTIN NYSTROM, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE BRUNSWICK-BALKE-COLLENDER COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF DELAWARE.

BRAKE MECHANISM FOR TALKING-MACHINES.

1,207,986.

Specification of Letters Patent.

Patented Dec. 12, 1916.

Application filed May 20, 1916. Serial No. 98,820.

To all whom it may concern:

Be it known that I, MARTIN NYSTROM, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Brake Mechanisms for Talking-Machines, of which the following is a specification.

This invention relates in general to talking machines and more particularly to an automatically operable brake mechanism therefor.

The primary object of my invention is the provision of readily adjustable means for automatically stopping the rotation of the record table when the reproduction has been completed.

A further object of my invention is the provision of means whereby the brake-releasing means is readily set to operate at the desired point in the travel of the tone arm which point varies with the particular record reproduced.

Further objects and advantages of my invention will be apparent as it is better understood by reference to the following specification when read in connection with the accompanying drawing, illustrating the preferred embodiment thereof, in which—

Figure 1 is a plan view of a talking machine with my improved brake mechanism applied thereto; Fig. 2 is a side elevation partially in section of the structure illustrated in Fig. 1; Fig. 3 is an enlarged detail in perspective of the brake and the latch therefor, and Fig. 4 is an enlarged sectional detail illustrating the adjustable means for releasing the latch.

Referring to the drawings, 1 indicates a suitable casing or support upon which the record table 2 is rotatably mounted to support the record 3. The table 2 is driven by a suitable mechanism well known in the art and therefore not illustrated and is preferably provided with a depending flange 4. A tone arm 5 is supported in movable relation to the sound amplifier 6 and is provided with a sound box 7 carrying a stylus 8 adapted to cooperate with the record 3 in the well known manner to reproduce the sounds recorded on the record.

A plate 9 is secured to the upper surface of the support 1 beneath the table 2. Pivotal-ly mounted at 10 on the plate 9 is a brake 11 having a manually operable handle 12

projecting beyond the periphery of the table 2 and friction material 13 adapted to cooperate with the inner face of the depending flange 4 to prevent rotation of the table 2 when the brake is in operative position. The brake 11 is provided with two abutments 14 and 15.

Pivotal-ly mounted at 16 on the plate 9 is a latch 17 having an arm 18 adapted to cooperate with the abutment 14 to limit the movement of the brake 11 and with the abutment 15 to retain the brake 11 in inoperative position. A spring 19 provides a resilient connection between the brake 11 and the latch 17 and an abutment 20 on the plate 9 limits the movement of the latch 17 by engagement of the arm 18 therewith.

Pivotal-ly mounted at 21 on the plate 9 is a lever 22 which is pivotal-ly connected at 23 to the latch 17. The lever 22 is provided with an arm 24 extending beyond the periphery of the table 2 in the path of a depending finger 25 of the member 26 pivotal-ly mounted at 27 on a plate 28 secured to the tone arm 5. The plate 28 is provided with an indicator 29 bearing a plurality of numerals 30 adjacent a slot 31 in which the end of the member 26 operates. A handle 32 is provided whereby the member 26 may be readily adjusted with respect to the indicator 29.

The mode of operation of my invention is as follows: When the operator desires to release the table 2 the handle 12 is moved in the direction of the bottom of the sheet, viewing Fig. 1, the spring 19 being thereby placed under tension and the arm 18 of the latch 17 being caused to engage the abutment 15 to retain the brake 11 in inoperative position. The stylus 8 is then placed in the outermost groove of the record in the usual manner. When the reproduction has been completed the finger 25 will engage the arm 24 of the lever 22, thereby swinging the lever 22 and the latch 17 on their respective pivots to withdraw the arm 18 from engagement with the abutment 15 and allow the spring 19 to move the brake 11 to operative position to prevent further rotation of the table 2. Obviously the point in the travel of the tone arm 5 when the reproduction is completed will vary with individual records and consequently it is necessary to adjust the finger 25 for each record. This is accomplished by placing the stylus 8 in approximately the

innermost groove of the record and swinging the member 26 to a position in engagement with the arm 24 of the lever 22, the brake 11 having been first moved to inoperative position. The numeral on the indicator 29 adjacent the end of the member 26 when so adjusted is then marked upon the record so that the member 26 can be thereafter instantly adjusted to the proper position to release the brake 11 when the reproduction of the particular record is complete. When the records have been so marked it is unnecessary to experimentally determine the proper position of the member 26 to secure the effective operation of the mechanism.

The brake 11 may be manually moved to operative position by the handle 12 when desired without waiting for the automatic release of the brake since the movement of the handle 12 in the direction of the top of the sheet, viewing Fig. 1, will cause the abutment 15 to swing the latch 19 on its pivot 16, thus carrying the arm 18 out of engagement with the abutment 15 and into the path of the abutment 14.

It will be appreciated from the foregoing that I have perfected a brake mechanism for talking machines which is peculiarly advantageous because of the ease with which the automatic means for releasing the brake may be set to operate in conjunction with individual records without experimentally determining the operative position of the member 26 whenever a particular record is used. It will be further understood that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing any of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a mechanism of the character described, the combination of a brake adapted to engage a moving part of a talking machine, a latch to normally retain said brake in inoperative position, and means for releasing said brake including a lever pivotally connected to said latch, a member adjustably mounted on a tone arm of the talking machine and an indicator cooperating with said member, whereby said member may be readily set to release said brake at predetermined points in the travel of said tone arm.

2. In a mechanism of the character described, the combination of a pivotally mounted brake adapted to engage a moving part of a talking machine, a pivotally mounted latch to normally retain said brake in inoperative position, a spring connecting said brake and latch, and means for releasing said brake including a lever pivotally connected to said latch, a member adjust-

ably mounted on the tone arm of the talking machine and an indicator cooperating with said member, whereby said member may be readily set to release said brake at predetermined points in the travel of said tone arm.

3. In a mechanism of the character described, the combination of a pivotally mounted brake adapted to engage a moving part of a talking machine, means for manually moving said brake to operative or inoperative position, a latch resiliently connected to said brake to normally retain said brake in inoperative position, and means to automatically release said brake including a pivoted lever connected to said latch, a member adjustably secured to the tone arm of the talking machine and movable into engagement with said lever and an indicator cooperating with said member, whereby said member may be readily set to release said brake at predetermined points in the travel of the tone arm.

4. In a mechanism of the character described, the combination of a rotatable table, a pivotally mounted brake adapted to engage said table, and having an abutment thereon, a pivotally mounted latch having means thereon to engage said abutment and thereby retain said brake in inoperative position, a spring connecting said brake and latch, a lever pivotally connected to said latch, a tone arm, and means carried thereby to engage said lever and move said latch to release said brake.

5. In a mechanism of the character described, the combination of a rotatable table, a pivotally mounted brake adapted to engage said table and having an abutment thereon, means for manually moving said brake to operative or inoperative position, a pivotally mounted latch having means thereon to engage said abutment and thereby retain said brake in inoperative position, a spring connecting said brake and latch, a lever pivotally connected to said latch, a tone arm, and means carried thereby to engage said lever and move said latch to release said brake.

6. In a mechanism of the character described, the combination of a rotatable table, a pivotally mounted brake adapted to engage said table and having an abutment thereon, a pivotally mounted latch having means thereon to engage said abutment and thereby retain said brake in inoperative position, a spring connecting said brake and latch, a lever pivotally connected to said latch, a tone arm, adjustable means carried thereby to engage said lever and move said latch to release said brake, and an indicator cooperating with said adjustable means whereby said means may be readily set to release said brake at predetermined points in the travel of said tone arm.

7. In a mechanism of the character de-

scribed, the combination of a rotatable table
provided with a depending flange, a pivot-
ally mounted brake adapted to engage the
inner face of said flange and provided with
5 an abutment, means for manually moving
said brake to operative or inoperative posi-
tion, a pivotally mounted latch having
means thereon to engage said abutment and
thereby retain said brake in inoperative po-
10 sition, a spring connecting said brake and
latch, a lever pivotally connected to said

latch, a movable tone arm, a member adjust-
ably mounted on said tone arm and having
a depending finger adapted to engage said
lever, and an indicator coöperating with said 15
member whereby said finger may be readily
set to release said brake at predetermined
points in the travel of said tone arm.

MARTIN NYSTROM.

Witnesses:

M. D. HENDRICKSON,
S. J. RUBRY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

DISK RECORD HOLDER,
#1,208,346-----C. W. Marsh,
Patented-Dec. 12th, 1916.
Filed-Dec. 7th, 1915.

C. W. MARSH.
DISK RECORD HOLDER.
APPLICATION FILED DEC. 7, 1915.

Patented Dec. 12, 1916.

1,208,346.
Fig. 1

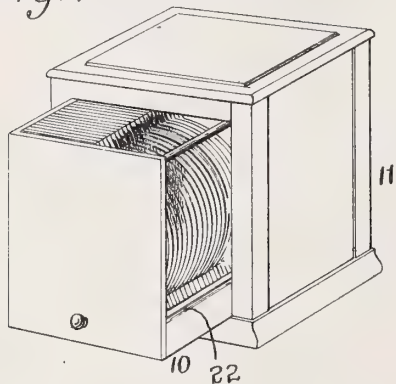


Fig. 3

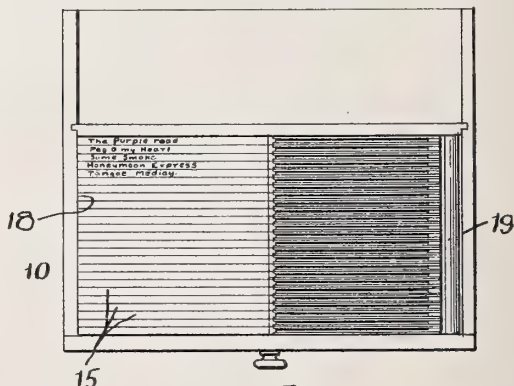


Fig. 2

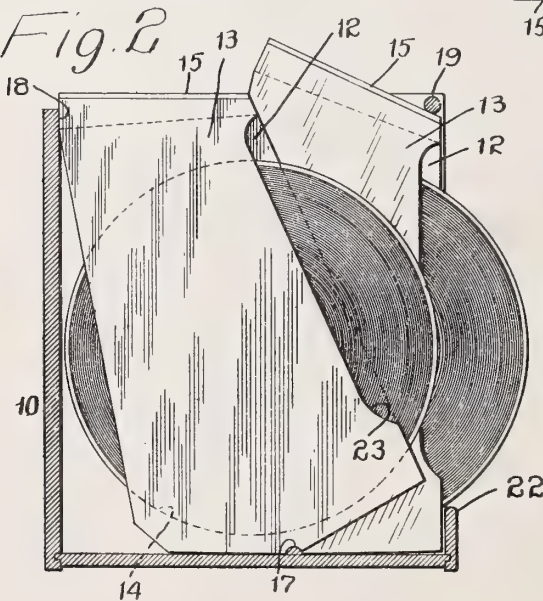


Fig. 4



Fig. 6

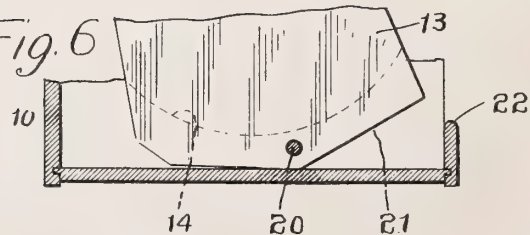
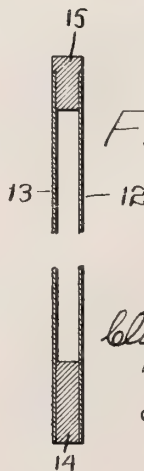


Fig. 5



WITNESSES:

H. W. Meade

INVENTOR

Clifford W. Marsh

BY

J. M. Wooster

ATTORNEY

UNITED STATES PATENT OFFICE.

CLIFFORD W. MARSH, OF BRIDGEPORT, CONNECTICUT.

DISK-RECORD HOLDER.

1,208,346.

Specification of Letters Patent.

Patented Dec. 12, 1916.

Application filed December 7, 1915. Serial No. 65,500.

To all whom it may concern:

Be it known that I, CLIFFORD W. MARSH, a citizen of the United States, residing at Bridgeport, county of Fairfield, State of Connecticut, have invented an Improvement in Disk-Record Holders, of which the following is a specification.

This invention has for its object to provide a convenient and inexpensive holder for disk records, as talking-machine records, which shall comprise a suitable frame and containers for individual records, the containers acting to retain the records securely in place, and when tilted forward to place the record carried thereby in advance of the other records so that it may be readily removed and will remain in position to receive the record after use. With this object in view I have devised the novel container and frame therefor, which I will now describe, referring to the accompanying drawing forming a part of this specification and using reference characters to indicate the several parts.

Figure 1 is a perspective view showing a plurality of containers each carrying a record in a frame arranged to slide as a drawer in a cabinet; Fig. 2 is a view on an enlarged scale showing the frame in section and a plurality of containers in elevation, one of the containers being tilted to the delivering position; Fig. 3 a plan view on the same scale showing the frame adapted for use as a drawer, as in Fig. 1; Fig. 4 an elevation of a container with a record therein, the near side of the container being removed; Fig. 5 a section on an enlarged scale on the line 5—5 in Fig. 4, looking in the direction of the arrows, and Fig. 6 is a detail view partly in elevation and partly in section, illustrating a variant form in which the containers tilt upon a rod instead of upon a rest.

10 denotes a frame which may be made of wood or metal, as preferred, and is closed at the bottom and preferably at the back, and is open at the top and side. As an illustration of a convenient application of the invention, I have shown in Figs. 1 and 2 a frame adapted to slide like a drawer in a cabinet indicated by 11. It should be understood, however, that the invention lies in the frame and the container, and that it is immaterial so far as the present invention is concerned how the frame is inclosed or whether or not it is inclosed at all.

My novel container comprises sides indi-

cated by 12 and 13, a base strip indicated by 14 and a top strip indicated by 15, the front and back being preferably open. The base and top strips may be made of wood and the sides of strong heavy paper, or light cardboard, and glued or otherwise firmly secured to the base and top strips. The sides are preferably recessed into the top strip, as shown in Fig. 5, so that the full width of the upper side of the top strip may be utilized to write or otherwise indicate thereon the name of the record carried by the container. The space between the sides is just wide enough to receive a record easily without waste of room. The upper side of the base strip is made to incline downward from both front and back to the center, the line being preferably a concave curve of a radius equal to or slightly greater than the largest records, so that records of any size may be received in the depression, which is indicated by 16, and will be retained therein in either position of the container. The exact shape or size of the containers is of course not of the essence of the invention. I preferably, however, make the frame and containers of approximately the relative size indicated in Fig. 2. In the normal or retaining position, the tops of the containers preferably lie horizontal to, and (for convenience in tilting them independently to the delivering position by a single movement) slightly above the top of the frame, as indicated in Fig. 2. Side 13 is preferably cut away slightly at the front relatively to side 12, as at 23, for convenience in returning records to place.

An important feature of the invention is that the containers tilt on a rest or rod from the normal or retaining to the forward or delivering position, and vice versa, and that in the retaining position, the center of gravity of the retainer is back of the fulcrum and in the delivering position it is forward of the fulcrum, suitable stops being of course provided to retain the container in either of these positions.

When it is desired to have the containers readily removable, they are fulcrumed upon a rest 17 extending across the bottom of the frame, the bases of the containers being provided with grooves to receive the rest, as clearly shown in Fig. 2. The inner side of the frame at the top serves as a stop for the containers when tilted to the retaining position, as at 18 in Fig. 2. When tilted to the delivering position, the top of the container

near the front edge comes in contact with a cross rod 19 which limits its forward movement, as clearly shown in Fig. 2.

If it is preferred that the container should be attached to the frame, instead of tilting upon a rest, a pivot rod 20 may be passed through holes in the bases of the containers, the rod being secured in the frame. I have shown the bottoms of the bases of the containers as inclining in an obtuse angle to each other from the pivotal point, so as to permit free tilting of the containers. Where the containers are pivoted on a rod, as in Fig. 6, the front base angle of the container, indicated by 21, operates in connection with the pivot rod, as a front stop in the delivering position, so that if preferred cross rod 19 may be dispensed with. At the bottom of the frame in front I provide a ledge 22 which may serve as a rest for the edges of the records and is convenient in returning them to place.

The operation of my novel record holder will be obvious from the drawing. Owing to the fact that the center of gravity in the retaining position is back of the pivotal point and in the delivering position is in front of the pivotal point, the containers are self-retaining in either position. No list or index is required. Each container may have the name of the record it carries plainly written on the top. To remove a record, the container is tilted forward, as indicated in Fig. 2. This leaves the front edge of the record projecting outward beyond the other records, so that it may be readily removed, although it is still retained in place by being seated in the depression in the base strip. The container remains in the delivering position and after use, the record is simply slid back to its place and the container tilted to the retaining position. As it is so easy to take a record from the holder or to return it to place, there is no inducement to remove more than one record at a time or to neglect to return a record after using it, it being just as easy to place a record in its container which is tilted forward waiting for it, as it is to lay it down.

The ledge forms a convenient rest for the edge of the record in returning it to place and as the near side of the container is cut away there is not the slightest difficulty in inserting it between the sides of the container. The containers work equally well with large or small records, each record remaining securely in place in either the retaining or delivering position of the container.

Having thus described my invention I claim:—

1. A holder of the character described comprising a frame having an open top and

an open side, a series of record containers mounted within said frame in side-by-side arrangement and adapted to be individually advanced and retracted by rocking movement to and from a position at said open side of the frame, and means for checking movement of said containers in both advanced and retracted positions, said containers being in a condition of stable equilibrium in each of said positions and the tops thereof being in a common substantially horizontal plane when said containers are in their retracted positions.

2. A holder of the character referred to comprising a frame having a closed side and an open side, record containers mounted to rock within said frame, and means contiguous to the open side of the frame to prevent movement of the containers beyond the plane of said open side, movement in the opposite direction being limited by the closed side of the frame.

3. A holder of the character referred to comprising a frame having a closed side and an open side, record containers mounted to rock within said frame, and a stop contiguous to the open side of the frame and positioned to engage the tops of the containers to prevent movement thereof beyond the plane of said open side, movement in the opposite direction being limited by the closed side of the frame.

4. A holder of the character described comprising a frame, record containers mounted within said frame to individually rock to and from advanced and retracted positions, and means at each side of said frame for limiting the range of rocking movement to the space between the sides of said frame, one of said means comprising a rod located laterally with respect to the containers and positioned to be engaged by the tops thereof, the top edges of said containers being normally in a common substantially horizontal plane when the containers are in retracted positions.

5. An improved disk record container comprising a body having a flat base upon which it is normally supported, spaced-apart sides which incline from the perpendicular when said body is resting upon said base, and a top disposed substantially parallel to said base.

6. The combination with a cabinet, of a drawer slidably mounted therein and open at one side, record containers mounted to rock within said drawer, and means contiguous to the open side of the drawer to prevent movement of the containers beyond the plane of said open side.

In testimony whereof I affix my signature.

CLIFFORD W. MARSH.

AUTOMATIC WINDING DEVICE
FOR PHONOGRAPHS,

#1,208,455-----G. Bedford,
Patented-December 12th, 1916.
Filed-May 23rd, 1916.

G. BEDFORD.
 AUTOMATIC WINDING DEVICE FOR PHONOGRAPHS.
 APPLICATION FILED MAY 23, 1916.

1,208,455.

Patented Dec. 12, 1916.
 2 SHEETS—SHEET 1.

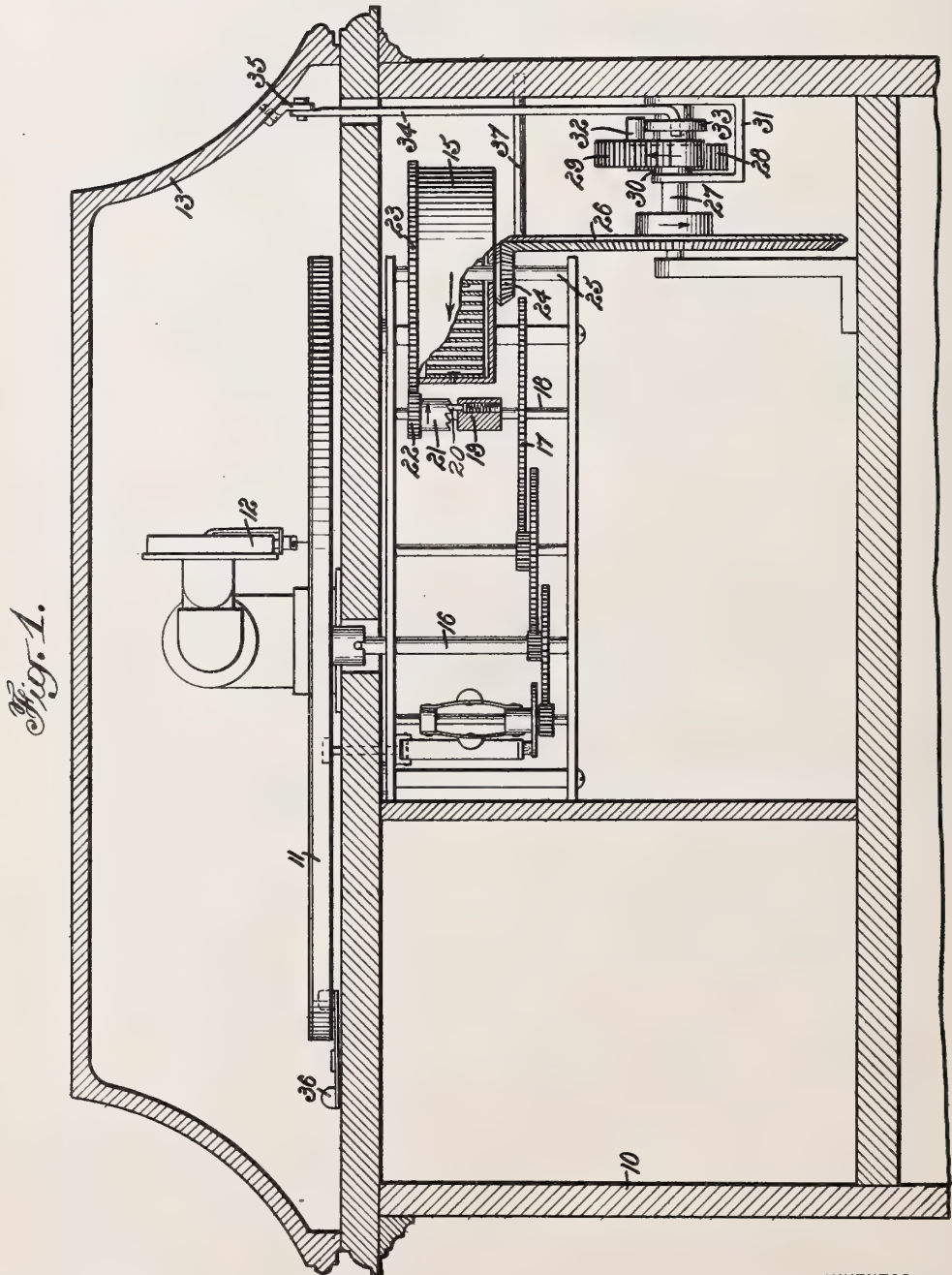


Fig. 1.

WITNESSES
L. Hauerstein
Geo. L. Beiler

INVENTOR
G. Bedford
 BY *M. M. Co.*
 ATTORNEYS



G. BEDFORD.
 AUTOMATIC WINDING DEVICE FOR PHONOGRAPHS.
 APPLICATION FILED MAY 23, 1916.

1,208,455.

Patented Dec. 12, 1916.
 2 SHEETS—SHEET 2.

Fig. 3.

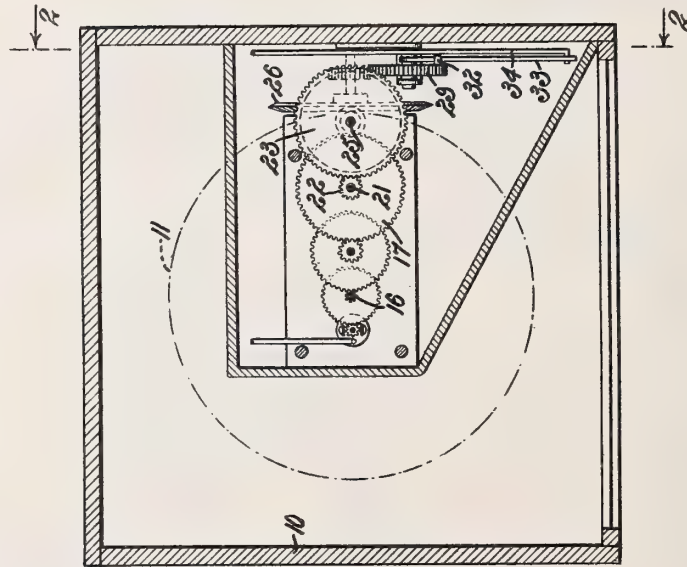


Fig. 4,

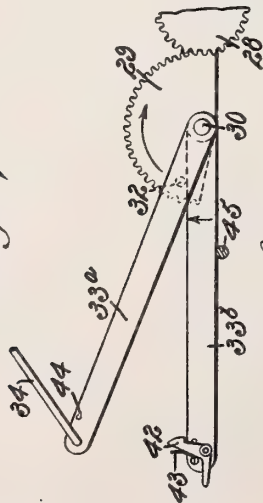
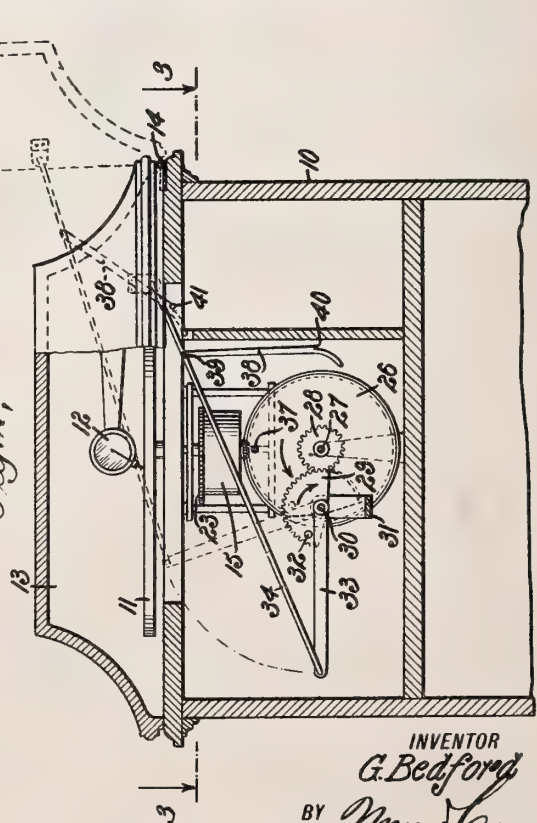


Fig. 2,



WITNESSES
L. Hausenstein
Geo. L. Bueler

INVENTOR
G. Bedford
 BY *Mum Co.*
 ATTORNEYS

UNITED STATES PATENT OFFICE.

GEORGE BEDFORD, OF BROOKLYN, NEW YORK.

AUTOMATIC WINDING DEVICE FOR PHONOGRAPHS.

1,208,455.

Specification of Letters Patent.

Patented Dec. 12, 1916.

Application filed May 23, 1916. Serial No. 99,288.

To all whom it may concern:

Be it known that I, GEORGE BEDFORD, a subject of the King of Great Britain, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Automatic Winding Device for Phonographs, of which the following is a full, clear, and exact description.

This invention relates to automatic musical instruments, and has particular reference to phonographs of the spring motor type.

The primary object of this invention is to provide a means whereby the spring will be automatically wound to its full capacity simultaneously with the lifting of the lid of the casing, requiring no attention whatever of the operator for this purpose.

A further object of the invention is to provide means in connection with the winding mechanism for holding the lid open during the changing of the records and needles, the winding connection between the lid and the motor being broken during the closing of the lid for the playing of the next record.

A further object of the invention is to provide means whereby upon the opening of the casing lid, the motor will be wound for a succeeding record of maximum size irrespective of the size of the preceding record and the corresponding unwinding of the spring for it.

A still further object is to provide means whereby the automatic winding device under the control of the lid may be disconnected after its usual operation, so that the lid may be left open if desired during the playing of the next record.

With the foregoing and other objects in view the invention consists in the arrangement and combination of parts hereinafter described and claimed, and while the invention is not restricted to the exact details of construction disclosed or suggested herein, still for the purpose of illustrating a practical embodiment thereof reference is had to the accompanying drawings, in which like reference characters designate the same parts in the several views, and in which—

Figure 1 is a vertical central transverse section of a phonograph illustrating one form of my improvement; Fig. 2 is a vertical section at right angles to the plane of Fig. 1 and substantially on the line 2—2 of Fig. 3; Fig. 3 is a horizontal section on the

line 3—3 of Fig. 2; and Fig. 4 is a detail view of a modification described below.

Referring now more particularly to the drawings, I show a phonograph cabinet at 10 of any suitable or well known type or design, and at 11 is indicated the turn table upon which the records are supported in the usual manner for cooperation with the reproducer 12. The cabinet is provided with a lid 13 hinged at 14 at the rear of the top portion of the cabinet to swing upwardly and rearwardly as indicated in dotted lines in Fig. 2.

The spring motor mechanism is of a more or less conventional type in so far as the spring casing or support 15 and the gear connections between it and the table shaft 16 are concerned.

The first gear 17 of the train is secured to a shaft 18, to which is connected a clutch member 19 having a spring operated pawl 20 cooperating with the teeth of a one-way clutch member 21, to which is secured a pinion 22 adapted to rotate idly around the shaft and over the pawl in the direction indicated by the arrow on Fig. 1. By the term one-way clutch as used in this specification, I mean to cover broadly any mechanical connection serving to engage in one direction and slip in the other. This pinion 22 meshes constantly with a large gear 23, which like the pinion 24 is secured to the spring casing 15. The casing and the two gears just mentioned are adapted to rotate around a fixed post 25, one end of the spring being secured to the post and the other end to the interior of the casing 15. The arrows on the gear members indicate the direction of movement during the winding operation.

At 26 is a large gear secured to a shaft 27 having a pinion 28 secured to the other end thereof. This pinion 28 is in mesh with a gear segment 29 journaled upon a shaft 30 mounted in a bracket 31 secured to the cabinet. The segment at 29 is provided with a laterally projecting lug 32 against which an arm 33 bears during the winding of the spring. The inner end of the arm 33 is pivoted loosely upon the shaft 30 and at its outer end is connected a rod 34 whose other end is connected directly to the cabinet lid 13 by means of a bracket 35 or its equivalent. When the lid is lifted, the arm 33 will move through the arc of a circle from the

normal position shown in full lines in Fig. 2 to or slightly beyond the position shown in dotted lines, and during such movement of the arm it will engage somewhere along the line of movement with the lug 32, the exact point at which this engagement takes place depending upon the size of the previous record and the corresponding unwinding of the spring. In this winding operation the lid serves to act as a lever, and hence it may fairly be so termed. It will thus be seen that this action upon the segment 29 will actuate the pinion 28 and gear 26 to rotate the spring support 15 in the direction to wind the spring, and the winding of the spring will be approximately to the maximum extent at the end of each opening movement of the lid. It is to be noted also that, as shown herein, the spring is wound from the outside or outer end, the same end as unwinds to drive the turntable shaft 16, in the ordinary operation of the phonograph. This manner of winding the spring is essential in that the unwinding of the spring returns certain of the connections between the spring and the phonograph casing lid to their normal position, so as to be engaged again by the lid devices when the lid is being opened again, and this is why it is necessary for the one-way clutch to be interposed between the spring support and the turntable. It is to be noted in this connection that in the assemblage of the parts, the spring will be partially wound so that while the latter part of the record is being played, ample force will be derived from the spring to insure a steady and satisfactory musical effect. In other words, while the capacity of the spring may be considerably more than sufficient to operate the mechanism for the largest record, the playing of the largest record will not exhaust the power of the spring, and hence with the complete rewinding of the spring at each opening of the lid for the change of the records, I always have proper tension or power in the motor for the best results.

Assuming that the instrument is idle and the manual stop 36 is applied to the periphery of the table 11 in the usual manner holding the shaft 16 from rotation, the opening of the lid, through the connections above set forth, will insure that the spring will be wound to the desired full extent. The spring, however, will be held from unwinding by virtue of the pawl 20 acting upon the clutch member 21, thereby positively holding the spring from operation until the manual stop 36 is released after the record is applied to the table in the usual manner. Since the gear connections between the pinion 22 and pinion 28 are positive, it will be understood that the gear segment will be held in its elevated position until the spring during its intended unwinding for the driving of the

machine will return it again to its normal position, and hence the lug 32 remains elevated accordingly. After the record is applied and the motor started, the lid will then be closed for the best musical effects. This closing of the lid will return the arm 33 to its normal position and the record will be played. If it is of the largest size, the lug 32 will be brought into proximity with the arm by the time the end of the record is reached, when the lid is again to be lifted to stop the motor and to replace the record. During the lifting of the lid for this purpose, the spring will be again wound to its full capacity and during the slight interval of time required for this operation, the momentum of the table 11 will continue the music without interruption until the operator stops it. From the nature of the winding device described herein and illustrated, it will be seen that the spring will never be unwound, and by no possibility can it be overwound. The bar or pin 37 may be secured to the side of the cabinet to bear lightly against the gear 26 adjacent the pinion 24 so as to prevent any slippage due to the wobbling of the gear.

The mechanism disclosed herein for automatically winding the spring simplifies the construction of the phonograph materially and eliminates the marring of the cabinet for the purpose of inserting a winding crank. Another advantage of this mechanism is the simplicity with respect to the means for holding up the lid, that is to say, by simply applying a link 38 to the rod 34 at the point 39, I provide an automatic brace or holding means, the lower free end of the link being provided with a shoulder 40 adapted to cooperate with a pin 41 carried by the cabinet. When the lid is opened for the purposes above set forth, the link 38 will drag idly over the pin 41 to a slight distance beyond the shoulder 40, so as to provide ample running time for the motor before it is again closed by the lifting of the link from the pin.

In the usual practice of the best phonographs, it is customary to close the lid for the best musical effect during the playing of each record. Therefore, I provide a means whereby the winding may be effected substantially automatically and without any thought or attention whatever of the operator if he operates in the usual manner. If, however, it is necessary that the lid be left open during the playing of a record, the arm to which the rod 34 is connected may be made in two separable parts 33^a and 33^b both journaled at their inner ends idly upon the shaft 30. As suggested in Fig. 4, the rod 34 is connected to the arm 33^a and the two arms are detachably connected by any suitable catch 42 adapted, however, to be released by the operation of a finger of the operator

against the force of a light spring 43. The catch operates over a pin 44 or its equivalent on the opposite arm. The arrangement is such that during the usual proper operation of the machine the two arms will operate as one, as in the description given earlier, but if a record is to be played with the lid open, the operator will release the catch 42 and allow the arm 33^b to drop until it rests upon a stop 45 carried by the side of the cabinet or some other stationary support. The other arm 33^a stays in its elevated position, but since it is offset from the gear segment 29, it will not obstruct the return movement of the lug 32. For rewinding the spring after such operation, the operator may actuate the arm 33^b directly or he may lower the lid and then lift it. The lowering of the lid will cause the automatic connection between the two arms, and hence the spring will be wound in the manner already described, ready for the succeeding record.

This winding device may be applied to machines already built with a slight outlay of time and expense, very few new parts being required. In the manufacture of new machines, however, the operation is simplified over the old practice, the number of parts being required being less than usual for hand winding devices. The machine is thoroughly practical as has been proved by my own experience. Furthermore, it is reliable in every respect, being simple in construction, and it cannot get out of order or fail to operate.

I claim:

1. The combination with a cabinet, a movable lid therefor, and a spring motor within the cabinet, of connections between the lid and the motor for completely winding the spring at each opening movement of the lid, said connections including an arm and another member mounted to swing around the same axis, lost motion engaging means between the arm and the other member effective in one direction but idle in the other, and a rigid bar pivotally connecting the free end of the arm to the lid.

2. The combination with a cabinet, a movable lid therefor, and a motor carried by the cabinet, of connections between the lid and the motor for storing full power in the motor at each opening movement of the lid, said connections including an arm and another member mounted to swing around the same axis, lost motion engaging means between the arm and the other member effective in one direction but idle in the other, and means connecting the free end of the arm to the lid.

3. The combination with a phonograph cabinet, a movable lid therefor and a spring motor within the cabinet, of automatic winding devices for the motor spring actuated by the opening of the lid, said winding de-

vices including a rotary member having positive connection with one end of the spring and movable with said spring in opposite directions during the winding and unwinding thereof respectively, and a lever connected to the lid and coöperating with said rotary member to actuate the same in one direction for winding the spring and movable freely in the opposite direction away from said rotary member when the lid is closing.

4. In a phonograph, the combination of a cabinet, a hinged lid therefor, a spring motor within the cabinet, the spring of the motor being adapted to wind and unwind from the same end, lost motion connections between the lid and the spring serving to wind the spring while the lid is being opened but permitting free unwinding movement of the spring when the lid is closed, said connections including a rigid bar connected to the lid and a link pivoted to the bar and coöperating with the cabinet to hold the lid open temporarily, said link having lost motion connection with the cabinet whereby the lid is permitted to move slightly toward its closed position to permit sufficient unwinding of the spring to initiate the playing of the record preliminary to the release of the lid for closing.

5. In an automatic winding device for phonographs, the combination with a spring motor including a casing and a pinion secured to the casing, of a gear in mesh with said pinion, a segment having a projecting lug, connections between the segment and the gear whereby the rotation of the segment will cause rotation of the gear at relatively high peripheral speed, a pivoted arm adapted to bear against said lug to rotate the segment, a lid, and a member extending from the free end of the arm to the lid to oscillate the arm each time the lid of the phonograph casing is lifted.

6. The combination with a phonograph cabinet including a hinged lid, a spring motor, a record table and speed multiplying connections between the spring and the table, of winding means for the motor insuring that at each opening movement of the lid the spring will be fully wound, said winding means including a gear having positive connection with the spring casing, said gear having a lateral projection, a pivoted arm, and a bar connection between the arm and the lid whereby the arm is caused to engage the lateral projection while the lid is being opened, said arm, however, swinging freely away from the projection while the lid is being closed.

7. In a phonograph, the combination with a cabinet body, a spring motor carried by the body and a lid hinged to the body, of a bar pivoted to the lid, connections between the bar and the spring for automatically winding the spring when the lid is moved on

its hinges, and a member carried by said bar to lock the lid temporarily open.

8. The combination with a phonograph cabinet including a hinged lid, a spring motor, a record table and speed multiplying connections between the motor and the table, of winding means between the lid and the motor insuring the complete winding of the spring each time the lid is opened, said winding means including a train of gears connected to the motor spring, all of the gears of the train bearing a constant positive relation to the motor spring, a pivoted arm having lost motion connection with one of said gears, and a connecting member between the arm and the lid to cause said arm to actuate said last mentioned gear when the lid is moved in one direction and to swing freely therefrom when the lid is moved in another direction, said gear being movable with the unwinding of the spring toward said arm.

9. In an automatic winding device for phonographs, the combination with a spring motor including a support and a pinion secured to the support, of a gear meshing with said pinion, a segment having a projection, connections between the segment and the gear whereby the rotation of the segment will cause rotation of the gear at relatively high speed, a movable arm adapted to bear against said projection to rotate the segment, a lever, and means connecting the lever with said arm and serving to move the arm and completely wind the motor spring each time the lever is operated in one direction.

10. The combination with a phonograph cabinet, a movable lid therefor and a spring motor within the cabinet, of automatic devices for storing power in the motor spring

actuated by the opening of the lid, said power storing devices including a rotary member having positive connection with one end of the spring and movable with said spring in opposite directions during the storing of power therein and the delivery of power therefrom respectively, and a lever connected to the lid and coöperating with said rotary member to actuate the same in one direction for storing power in the spring and movable freely in the opposite direction away from said rotary member when the lid is being closed.

11. The combination with a phonograph cabinet including a hinged lid, a spring motor, a record table, and speed multiplying connections between the spring and the table, of power storing means for the motor insuring that at each opening movement of the lid full power for a record of the largest size will be stored in the spring, said power storing means including a wheel having positive connection with the spring, said wheel having a lateral projection, a pivoted arm, and connections between the arm and the lid whereby the arm is caused to engage the lateral projection when the lid is being opened, but permitting said arm to move freely away from the projection when the lid is closed.

12. In a phonograph, the combination with a cabinet body, a motor carried within the body, and a lid pivoted to the body, of connections between the lid and the motor for automatically storing power in the motor when the lid is moved on its pivot, and means coöperating with said connections to hold the lid in open position.

GEORGE BEDFORD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

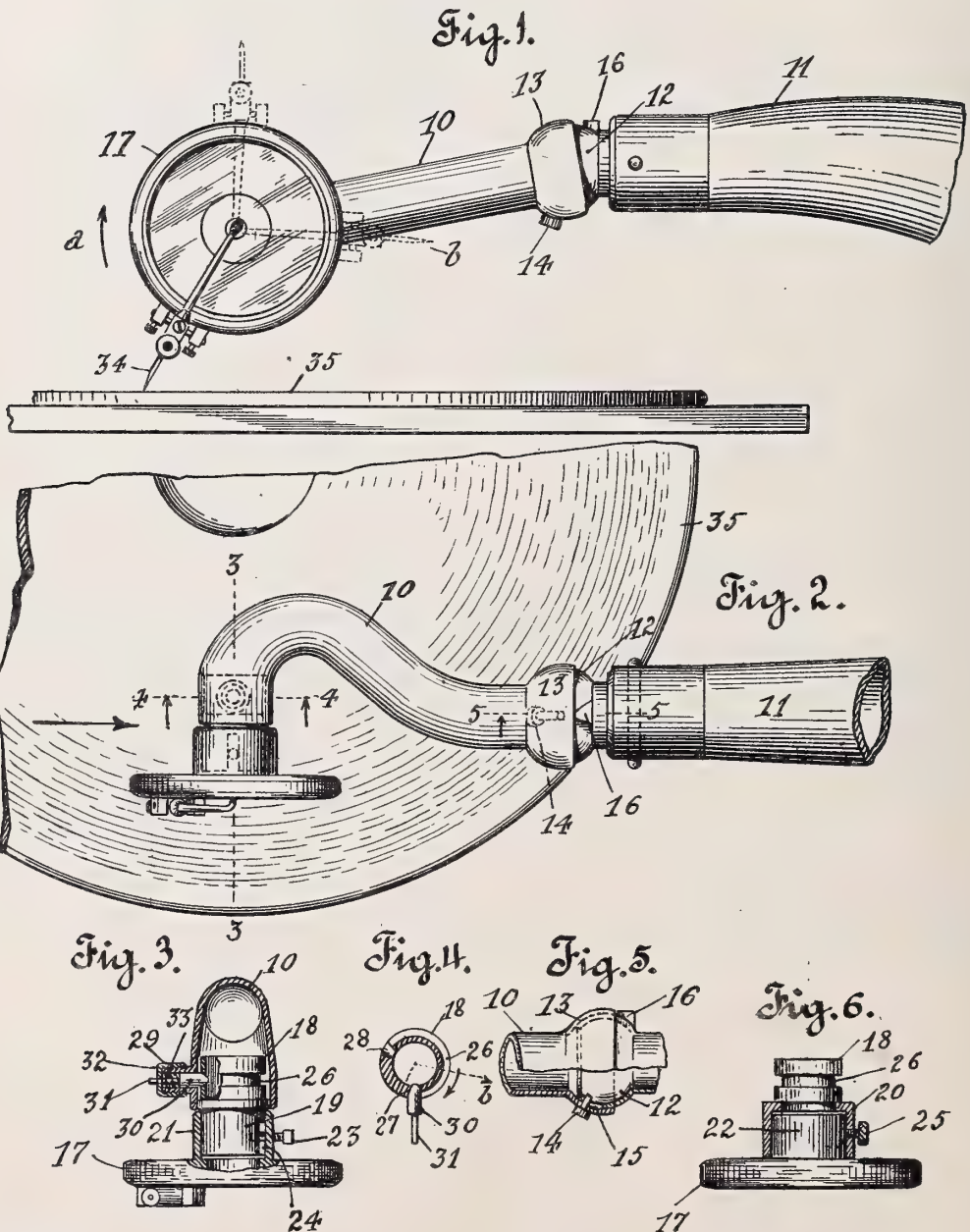
SOUND BOX ATTACHMENT FOR
PHONOGRAPHS.

#1,208,561-----S. E. Huff,
Patented-December 12th, 1916.
Filed-Sept. 14th, 1914.

S. E. HUFF.
SOUND BOX ATTACHMENT FOR PHONOGRAPHS.
APPLICATION FILED SEPT. 14, 1914.

1,208,561.

Patented Dec. 12, 1916.



Witnesses,
Ed. Monteverde.
Marguerite Bates.

Inventor,
by *Stephen E. Huff.*
Frank Thomas
Attys.

UNITED STATES PATENT OFFICE.

STEPHEN E. HUFF, OF LOS ANGELES, CALIFORNIA.

SOUND-BOX ATTACHMENT FOR PHONOGRAPHS.

1,208,561.

Specification of Letters Patent.

Patented Dec. 12, 1916.

Application filed September 14, 1914. Serial No. 861,497.

To all whom it may concern:

Be it known that I, STEPHEN E. HUFF, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles, State of California, have invented new and useful Improvements in Sound-Box Attachments for Phonographs, of which the following is a specification.

This invention relates to a sound box attachment for phonographs, and pertains especially to an attachment whereby phonographs constructed to play "hill and dale" groove records may be used to play lateral groove records.

It is an object of this invention to provide an attachment of the above described character with which any one of several standard type sound boxes may be used.

It is another object of this invention to provide a sound box attachment of the above described character in which the sound box may be turned to provide for the insertion and removal of the needle.

It is a further object of this invention to provide the connection for the sound box whereby the latter may be turned and temporarily locked in either its operative or inoperative position.

The invention is illustrated in the accompanying drawing, in which:

Figure 1 is a view in side elevation illustrating a sound box as mounted in accordance with this invention, and indicating in dotted lines the positions assumed by the sound box when inserting and removing the stylus, and when the sound box is not in use. Fig. 2 is a plan view. Fig. 3 is a vertical section on the line 3—3 of Fig. 2 partly in elevation. Fig. 4 is a detail section on the line 4—4 of Fig. 2. Fig. 5 is a detail section on the line 5—5 of Fig. 2, partly in elevation. Fig. 6 is a detail view of the mounting showing it as adapted to receive a male connection on the sound box.

More specifically, 10 indicates the tubular union connected to the phonograph tone arm 11 by means of a ball and socket joint comprising the ball member 12 formed at the base of the horn and the socket 13 carried by the union 10. A pin 14 on the walls of the socket 13 extends into a slot 15 formed in the ball 12 to restrict the universal movement of the union 10 in relation to the tone arm 11 and a shoulder 16 is formed on the ball and adapted to be engaged by the edge of the socket 13 at the upper portion thereof

so that upward movement of the union 10 will be limited and a rigid engagement between the union and the tone arm 11 effected at this point.

The means for attaching the sound box 17 to the outer end of the union 10 consists of a tubular adapter 18 adapted to extend into the outer end of the union 10 in engagement therewith, said adapter 18 having an outwardly extending tubular portion 19 which may comprise a male member as shown in Fig. 3 or may consist of a female member 20 as shown in Fig. 6 according to whether the sound box 17 is formed with a female nipple 21 as shown in Fig. 3, or a male nipple 22 as shown in Fig. 6. The member 19 is designed to extend into the member 21 in frictional engagement therewith, and a screw 23 on the member 21 is adapted to extend into a slot 24 in the member 19 to form an engagement between the members 19 and 21 whereby turning of these members in relation to each other is prevented.

In the construction shown in Fig. 6 a set screw 25 is mounted in the member 20 and is adapted to engage the member 22 on the sound box 17 to effect a secure engagement between the members 20 and 22.

The adapter 18 is designed to be rotated in its mounting in the end of the union 10 and to be locked against movement both in an operative and inoperative position. For this purpose the adapter 18 is formed with an annularly extending channel 26, here shown as extending approximately three-fourths of the distance around the circumference of the adapter 18 and terminating in apertures 27 and 28. Formed on the union 10 is an externally threaded tubular member 29 which opens to the interior of the union 10 opposite the channel 26 formed in the adapter 18, and reciprocally mounted within the tube 29 is a plunger 30, the inner end of which is mounted and extends into the channel 26 and is adapted to engage the apertures 27 and 28 to hold the adapter 18 and the sound box 17 thereon against rotation. The plunger 30 is formed with a stem 31 which projects through an opening formed in a cap 32, fitted on the outside of tube 29, and wound around the stem 31 interposed between the cap 32 and the plunger 30 is a spring 33 which operates to normally maintain the plunger 30 in its innermost position. The tension of the spring 33 may be ad-

justed by turning the cap 32 on its threaded connection with the tubular member 29.

In the operation of the invention, the sound box 17 on the adapter 18 is disposed in the position shown in Fig. 1 to place the stylus 34 in operative connection with the phonographic disk 35. When thus positioned the plunger 30 will engage the aperture 27 to hold the sound box against displacement in relation to the union 10.

When it is desired to remove or replace the stylus 34 the sound box 17 is rotated in the direction indicated by the arrow *a* in Fig. 1 to dispose the stylus carrying bar in the upright position indicated in dotted lines in Fig. 1; plunger 30 riding out of engagement with the walls of the aperture 27 on rotary pressure being applied to the sound box. The sound box may then be restored to its initial position by turning it in the reverse direction or it may be turned to dispose the stylus in a horizontal position with the point of the stylus extending in a rearward direction as indicated by the dotted lines *b* in Fig. 1. When thus positioned the plunger 30 will extend into the aperture 28 and thereby lock the sound box with the stylus retracted out of its operative position.

The plunger 30 in engaging the circumferential groove 26, serves to hold the adapter 18 against withdrawal out of engagement with the union 10, and being under the tension of the spring 33 bears against the walls of the groove 26 when disposed therein and out of engagement with the walls of the apertures 27 and 28 to frictionally oppose free rotation of the adapter 18 so that the latter will tend to remain in any position within its range of movement. The frictional engagement of the plunger 30 with the walls of the groove 26 may be varied by adjusting the cap 29.

What I claim is:

1. A sound box mounting for phonographs, comprising the combination of a tubular elbow union having means for connecting it to a tone arm, an adapter revolvably mounted in said union having at one end a tubular portion adapted to be connected to the nipple of a sound box and at the other end a circumferentially extending groove formed with recesses, and a spring pressed plunger carried by said union arranged to extend into said groove to hold the adapter against disconnection from the union and adapted to extend into the recesses in said groove to lock the coupling against free movement.

2. A sound box mounting for phonographs, comprising the combination of a tubular elbow union having means for connecting it to a tone arm, an adapter revolvably mounted in said union having at one end a tubular portion adapted to be connected to the nipple of a sound box and at the other end a groove extending partially around the circumference thereof formed with recesses at the terminations of said groove, a spring pressed plunger carried by the union adapted to extend into said groove to hold said adapter against disconnection from the union, and adapted to extend into the recesses at the ends of the groove to lock the coupling against free movement, said plunger arranged to permit movement of said union in either direction.

In witness that I claim the foregoing I have hereunto subscribed my name this 1st day of September, 1914.

STEPHEN E. HUFF.

Witnesses:

MARGUERITE BATES,
MARIE BATTEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

ADJUSTABLE TONE ARM AND SOUND BOX
COUPLING,

#1,208,603-----L. Markels,
Patented-December 12th, 1916.
Filed-May 29th, 1915.

L. MARKELS.
ADJUSTABLE TONE ARM AND SOUND BOX COUPLING.
APPLICATION FILED MAY 29, 1915.

1,208,603.

Patented Dec. 12, 1916.

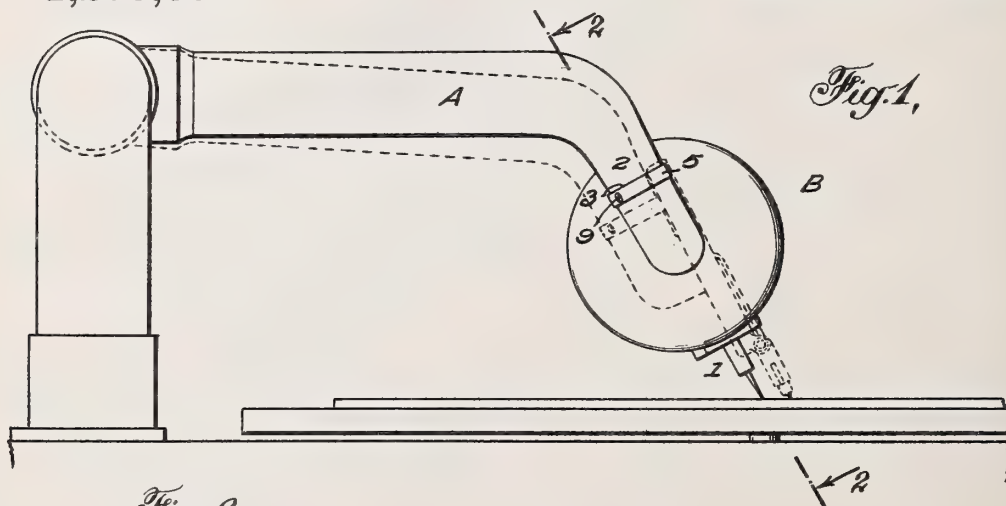


Fig. 2,

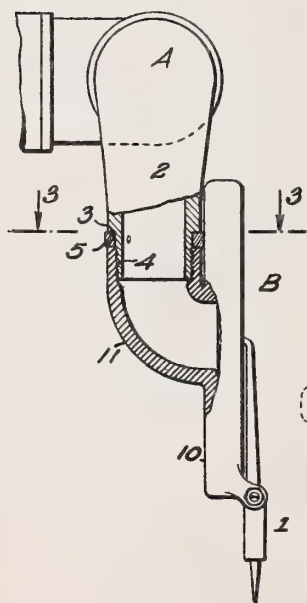


Fig. 3,

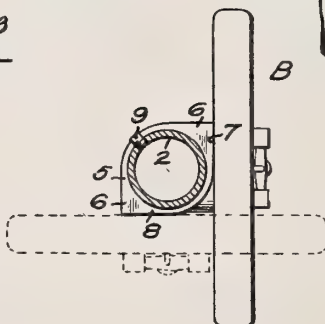


Fig. 4,

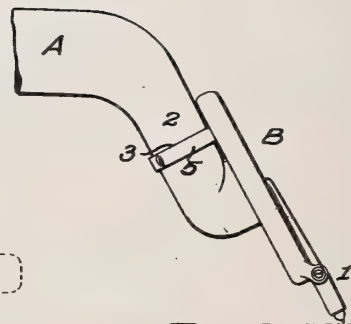


Fig. 5,

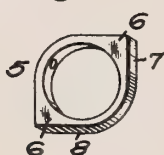
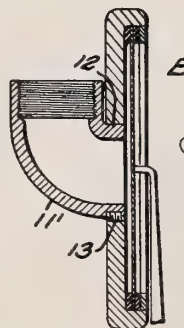


Fig. 6



WITNESSES
A. Hauerstein
W. Brachway

INVENTOR
Leonard Markels
BY *Mumford*
ATTORNEYS

UNITED STATES PATENT OFFICE.

LEONARD MARKELS, OF NEW YORK, N. Y., ASSIGNOR TO CHAMPION GRAPHOPHONE COMPANY, INC., OF NEW YORK, N. Y.

ADJUSTABLE TONE-ARM AND SOUND-BOX COUPLING.

1,208,603.

Specification of Letters Patent.

Patented Dec. 12, 1916.

Application filed May 29, 1915. Serial No. 31,149.

To all whom it may concern:

Be it known that I, LEONARD MARKELS, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Adjustable Tone-Arm and Sound-Box Coupling, of which the following is a full, clear, and exact description.

This invention relates to tone arms and sound boxes, and more particularly to an adjustable connection whereby the sound box can be set to operate on phonograph records having the up and down or lateral sound undulations.

The invention has for its general objects to improve and simplify the construction of devices of this character so as to permit of an easy and quick adjustment of the sound-box, to be of durable and substantial design and comparatively inexpensive to manufacture.

A further object of the invention is the provision of a pair of stops on the tone arm arranged at ninety degrees apart so that the back of the sound box body can engage with either stop and thereby be set at the proper position for operating on either type of disk phonograph record.

With such objects in view, and others which will appear as the description proceeds, the invention comprises various novel features of construction and arrangement of parts which will be set forth with particularity in the following description and claims appended hereto.

In the accompanying drawing, which illustrates one embodiment of the invention and wherein similar characters of reference indicate corresponding parts in all the views, Figure 1 is a side view of a tone arm showing by full lines the sound box thereon set for operating in a laterally waved record groove, and by dotted lines the sound box set for operating in a vertically waved sound groove; Fig. 2 is an enlarged front view of the tone arm and sound box with portions in sections; Fig. 3 is a sectional view on the line 3—3, Fig. 2, showing the two positions of the sound box; Fig. 4 is a side view showing the sound box set for operating in a vertically waved sound groove; Fig. 5 is a perspective view of the stop device applied to the tone arm; and Fig. 6 is a sectional view

showing a different form of elbow on the sound box.

Referring to the drawing, A designates a tone arm of a disk record phonograph, and B is the reproducer or sound box which has a needle or stylus holder 1 of any desired form. The sound box is capable of two adjustments so as to operate on either of the well-known types of disk records. Between the sound box and tone arm a special form of connection is provided that enables the sound box to be adjusted through ninety degrees about the axis of the outer downwardly bent extremity 2 of the tone arm. The extremity of the tone arm is externally reduced to form a shoulder 3, and the reduced portion is provided with an external thread 4. Surrounding this reduced portion and engaging the shoulder 3 is a stop ring 5 which has diametrically extending lugs 6 which provide surfaces 7 and 8 respectively that are disposed at an angle of ninety degrees to each other, said stop ring being detachably fastened to the tone arm by a set screw or equivalent device 9. The sound box has on the rear side of its body at an elbow 11 which may be integral with the body, or separate therefrom and securely fastened thereto, as shown in Fig. 6, where the elbow 11' enters an opening 12 in the sound box body and is fastened by a key screw 13. The elbow is threaded to screw on the extremity of the tone arm but the sound box can turn on the latter only through an angle of ninety degrees because of the stops 6 on the stop ring 5, as clearly shown in Fig. 3. By means of this arrangement the sound box can be quickly and easily set for operating on either type of phonograph disk record. In order to permit the sound box to be unscrewed completely from the tone arm the fastening screw 9 of the stop ring is taken out so that the ring can freely turn as the sound box is unscrewed. The construction of the adjustable connection between the tone arm and sound box is of neat and attractive appearance, comparatively simple to construct, and the design is such that no particular attention is required in adjusting the sound box to either of its positions, it being merely necessary to turn the sound box as far as it will move.

From the foregoing description taken in

connection with the accompanying drawing, the advantages of the construction and method of operation will be readily understood by those skilled in the art to which the invention appertains, and while I have described the principle of operation, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative and that such changes may be made when desired as fall within the scope of the appended claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. The combination of a tone arm, a sound box, an elbow on the sound box detachably connected with the tone arm and rotatable thereon, and a stop ring fixed on the tone arm and arranged to engage with and limit the turning of the sound box on the latter.

2. The combination of a tone arm section and a sound box section, one section having a portion into which the other section screws, and a ring on one section removably secured thereto and having spaced stops for limiting the relative turning of the sections through an angle of ninety degrees.

3. The combination of a tone arm section

and sound box section, said sections having parts rotatably connected by screw-threads, and a plurality of stops detachably fastened to one section and adapted to be engaged by the other section, whereby relative turning of the sections is limited to approximately ninety degrees, said stops being adapted to be loosened to permit the sections to be turned for screwing or unscrewing the sections.

4. A tone arm having a reduced extremity forming a shoulder, a ring on the said extremity and engaging the shoulder, means for detachably fastening the ring to the tone arm for preventing turning of the ring, said ring having spaced stops, a sound box, and a member connecting the box with the reduced portion of the tone arm and supporting the box in a position whereby the body thereof is adjustable to engage either of the said stops.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LEONARD MARKELS.

Witnesses:

C. BRADWAY,
PHILIP D. ROLLHAUS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

AUTOMATIC BRAKE FOR TALKING MACHINES,
#1,208,749-----F. Cirelli,
Patented-December 19th, 1916.
Filed-March 22nd, 1916.

F. CIRELLI.
 AUTOMATIC BRAKE FOR TALKING MACHINES.
 APPLICATION FILED MAR. 22, 1916.

1,208,749.

Patented Dec. 19, 1916.

2 SHEETS—SHEET 1.

FIG. 1.

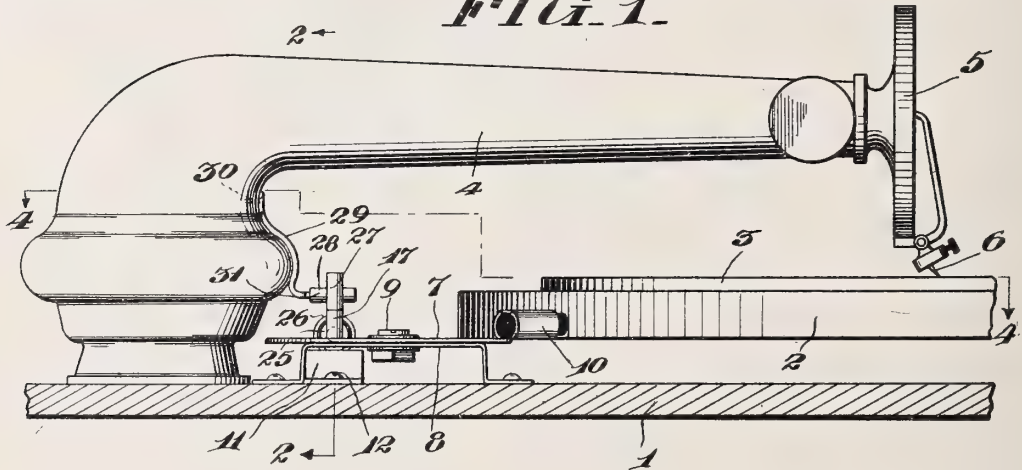


FIG. 2.

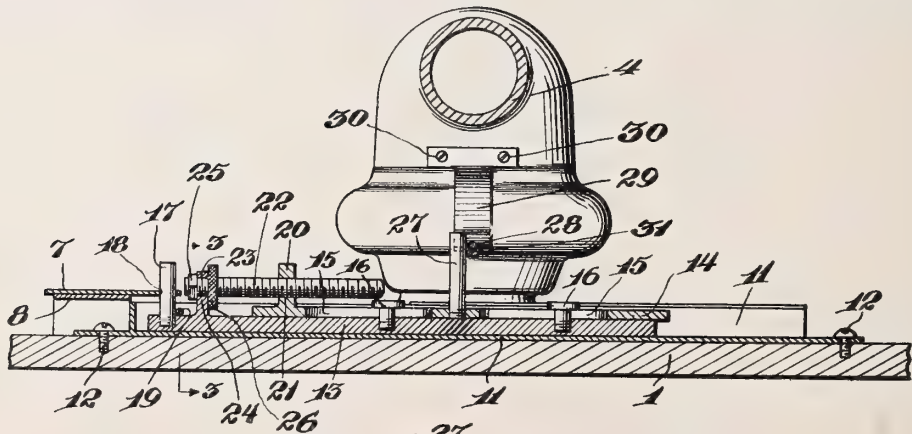
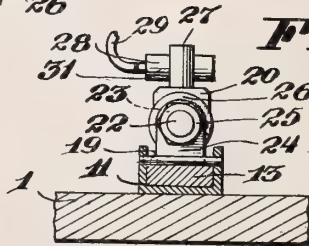


FIG. 3.



Inventor
 Francesco Cirelli,

Witnesses
 Wm. Conway
 C. R. Ziegler.

By Joshua R. H. Potts.
 His Attorney

1,208,749.

2 SHEETS—SHEET 2.

Inventor
Francesco Cirelli,

By Joshua R. H. Potts. 415 Attorney

His Attorney

UNITED STATES PATENT OFFICE.

FRANCESCO CIRELLI, OF PHILADELPHIA, PENNSYLVANIA.

AUTOMATIC BRAKE FOR TALKING-MACHINES.

1,208,749.

Specification of Letters Patent.

Patented Dec. 19, 1916.

Application filed March 22, 1916. Serial No. 85,786.

To all whom it may concern:

Be it known that I, FRANCESCO CIRELLI, a subject of the King of Italy, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Automatic Brakes for Talking-Machines, of which the following is a specification.

My invention relates to improvements in automatic brakes for talking machines, the object of the invention being to provide a brake which will be operated by the tone arm of a talking machine to stop the turn table when the needle reaches the end of the record.

A further object is to provide improvements of the character stated which can be applied to any ordinary type of talking machine, which will be simple and inexpensive in construction, and strong and durable in use.

With these and other objects in view, the invention consists in certain novel features of construction and combinations and arrangements of parts as will be more fully hereinafter described and pointed out in the claims.

In the accompanying drawings, Figure 1 is a fragmentary view in side elevation partly in section illustrating my improvements. Fig. 2 is a view in section on the line 2—2 of Fig. 1. Fig. 3 is a view in section on the line 3—3 of Fig. 2. Fig. 4 is a view in section on the line 4—4 of Fig. 1, and Fig. 5 is a view in section on the line 5—5 of Fig. 4.

1 represents the box or support of a talking machine, 2 the turn table, 3 the disk record on the turn table, 4 the pivoted tone arm, 5 the sound box, and 6 the needle engaging the record as is common in machines of this character.

7 represents a pivoted brake which constitutes a plate pivotally secured between its ends to a bracket 8 by means of a bolt 9, and having a brake shoe 10 at one end adapted to engage the periphery of the turn table 2.

A channel guide 11 is secured by screws 12 to the top of the box 1, and supports two bars 13 and 14, the bar 14 being supported on bar 13, and provided with longitudinal slots 15 through which headed screws 16 project. These screws are fixed to the bar 13, and their heads project over the upper surface of the bar 14, so that they hold the

bars together, but permit independent sliding movement of the bar 14 as will be hereinafter explained.

The bar 13 is provided at one end with a vertical pin 17 which projects through an opening 18 in brake 7, so that the brake is moved by the bar 13. A cross pin 19 is secured in the sides of the channel guide 11, limiting the movement of the pin 17 and bar 13 in one direction, and also facilitating the adjustment of the bars relative to each other as will hereinafter appear.

Bar 14 is provided with an upwardly projecting lug 20, having a screw-threaded opening 21 therein to receive an adjusting screw 22. This screw 22 is mounted to turn in an opening 23 in a lug 24 integral with bar 13, and is held against longitudinal movement of the lug 24 by means of a nut 25 on one end of the screw, and a knurled head 26 fixed to the screw at the opposite side of the lug 24.

The bar 14 carries a vertical pin 27 which is adapted to be engaged by a finger 28 on a bracket 29, the latter secured to the tone arm 4 by screws 30 or other approved securing means.

Finger 28 is preferably covered by a rubber tube 31 to prevent noise, and is adapted to engage the pin 27 and move bars 13 and 14 in a direction to apply the brake.

In operation, the device is set as follows:—The needle 6 is placed on the record disk at a point adjacent the end of the record groove. The head 26 is then turned to adjust screw 22, and move bar 14 relative to bar 13 until the pin 27 engages the finger 28 on the tone arm 4. The machine can then be started with the needle in the outer groove or starting point of the record, and when the end of the record is reached, the tone arm 4 will move the finger 28 so as to strike pin 27 and move the bars 14 and 13 longitudinally. This movement of the bars 14 and 13, through the medium of the pin 17 in the opening 18 of brake 7, will cause the brake to press the shoe 10 against the turn table 2, and stop the record.

It will be understood that the cross pin 19 acts as a guide to prevent the upward movement of the plate 13 due to any vibration which might occur, and furthermore it facilitates the adjustment in view of the fact that it prevents the slides from accidentally moving beyond a prescribed position, since the motion is limited in one direction by the

engagement of the pin 17 with the pin 19 and in the opposite direction with the upwardly projecting lug 24, so that while the upper bar may be adjusted to the extent of the length of the adjusting screw, the lower bar will always be in such position as to require but little movement to apply the brake.

It will thus be noted that with my improvements the parts can be adjusted to suit any record, and will automatically stop the turn table when the end of the record is reached.

Various slight changes might be made in the general form and arrangement of parts described without departing from my invention, and hence I do not limit myself to the precise details set forth, but consider myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination with a talking machine having a support, a turn table, and a movable tone arm, of a bracket, a plate movably carried by the bracket and including a brake shoe, said brake shoe being adapted to engage said turn table, two bars mounted to slide longitudinally and having limited independent movement, means for guiding said bars one with respect to the other, one of said bars being pivotally connected to said plate, a member on the other of said bars, means for adjusting the bars relatively to each other, and means on the tone arm adapted to engage said member and move the bars longitudinally to apply the brake, substantially as described.

2. In a device of the character described, the combination with a support, a turn table, and a pivoted tone arm, of a brake, a guide on the support, two bars mounted to slide in the guide and having a restricted independent movement, means for adjusting the bars relative to each other, a pin on one of the bars projecting through an opening in the brake, and coupling the parts together, an upwardly projecting pin on the other of said bars, and a finger on the tone arm adapted to engage the last-mentioned pin and move both bars and the brake in a direction to apply the brake, substantially as described.

3. In a device of the character described, the combination with a support, a turn

table, and a pivoted tone arm, of a bracket on the support, a brake pivotally supported between its ends on the bracket and having a brake shoe at one end adapted to engage the turn table, and having an opening adjacent its other end, two bars mounted to slide relative to each other, a pin on one of the bars projecting through the opening in the brake, means for adjusting the bars relative to each other, a pin on the other of said bars, and a finger on the tone arm adapted to engage the last-mentioned pin, substantially as described.

4. In a device of the character described, the combination with a support, a turn table, and a pivoted tone arm, of a channel guide on the support, two bars mounted to slide in the guide and having slot and pin connection, upwardly projecting lugs on the respective bars, a screw mounted to turn in one of said lugs and having screw-threaded engagement with the other of said lugs, a head on said screw, an upwardly projecting pin on one of said bars, a finger on the tone arm adapted to engage said pin, and a brake adapted to engage the turn table and operatively connected with one of said bars, substantially as described.

5. In a device of the character described, the combination with a support, a turn table, and a pivoted tone arm, of a channel guide on the support, two bars mounted to slide in the guide and having slot and pin connection, upwardly projecting lugs on the respective bars, a screw mounted to turn in one of said lugs and having screw-threaded engagement with the other of said lugs, a head on said screw, an upwardly projecting pin on one of said bars, a finger on the tone arm adapted to engage said pin, a pivoted brake on the support adapted to engage the turn table, and having an opening therein, a pin on one of said bars projecting through the opening in the brake, and a cross pin in the guide adapted to be engaged by the last-mentioned pin and limit the movement of the brake in one direction, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANCESCO CIRELLI.

Witnesses:

C. R. ZIEGLER,
CHAS. E. POTTS.

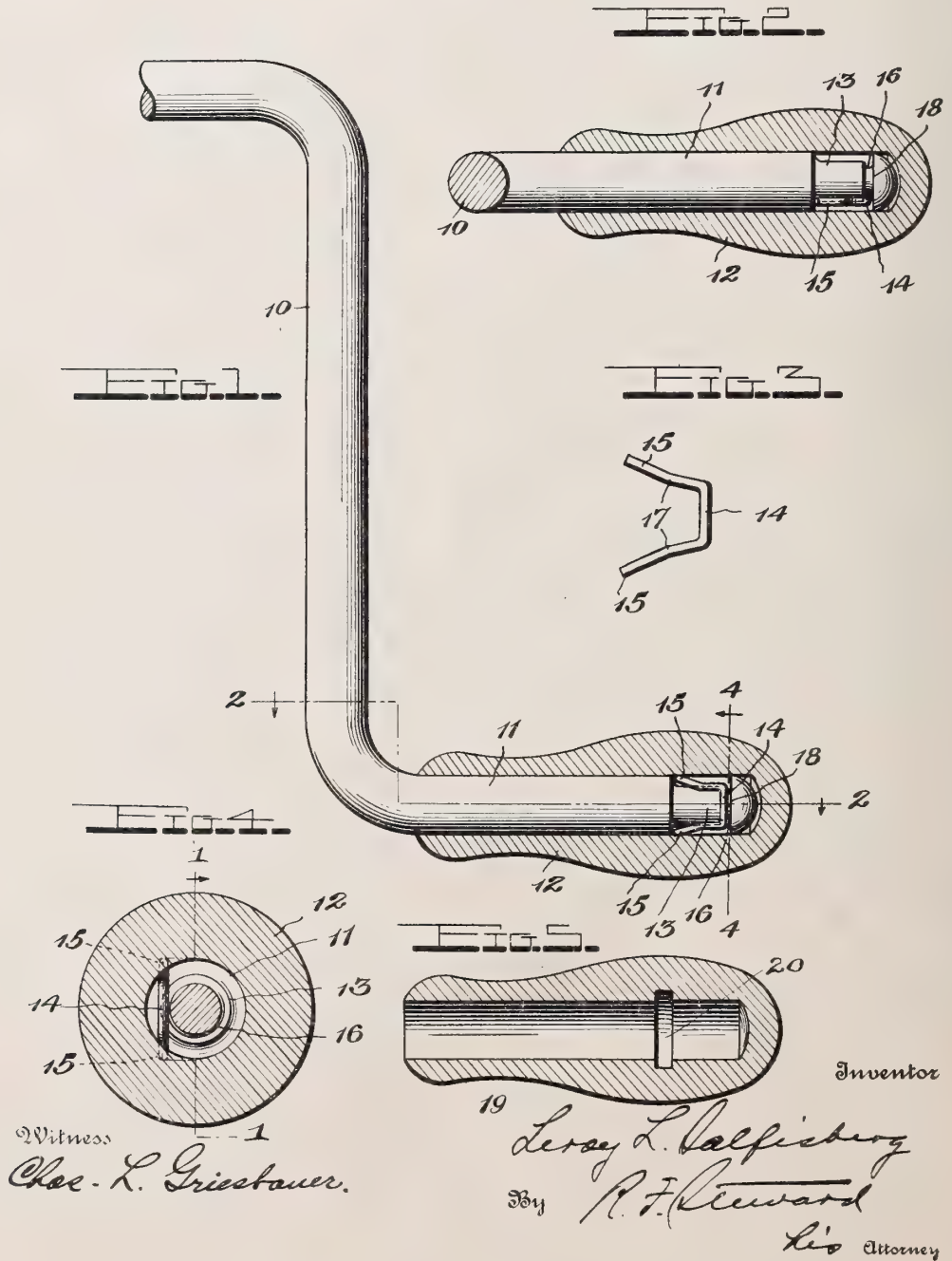
HANDLE DEVICE,

#1,208,839-----L L Salfisberg,
Patented-December 19th, 1916.
Filed-July 17th, 1916.

L. L. SALFISBERG.
HANDLE DEVICE.
APPLICATION FILED JULY 17, 1916.

1,208,839.

Patented Dec. 19, 1916.



UNITED STATES PATENT OFFICE.

LEROY L. SALFISBERG, OF PLANO, ILLINOIS, ASSIGNOR TO GRAY PIANO COMPANY, OF PLANO, ILLINOIS, A CORPORATION OF ILLINOIS.

HANDLE DEVICE.

1,208,839.

Specification of Letters Patent.

Patented Dec. 19, 1916.

Application filed July 17, 1916. Serial No. 109,742.

To all whom it may concern:

Be it known that I, LEROY L. SALFISBERG, citizen of the United States, residing at Plano, in the county of Kendall and State of Illinois, have invented certain new and useful Improvements in Handle Devices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to handle devices for cranks and the like and more particularly to a crank handle comprising a grip member secured to a crank spindle or pin by coupling means wholly inclosed and concealed between the grip member and the spindle, said coupling member being of such character and so disposed as to permit the grip to turn freely on the spindle, but to positively lock it against being pulled off the spindle.

In various types of hand cranks, such as those used with automobile engines, talking machines, etc., it is desirable to have a grip member adapted to be seized by the hand and revolvable with respect to the crank pin upon which it is mounted, so that when the crank is turned the handle grip will be free to turn with respect to its spindle and will not rub against the hand. Ordinarily a grip member of this description is secured in place by a nut, screw or rivet at the end of the crank pin, or by some other external fastening means; but such an arrangement is disadvantageous for the reason, among others, that it involves either a rough projecting fastening part, or else a countersink in the grip to avoid this. Attempts have also been made to couple a handle grip to its spindle by means located wholly within the grip; but the constructions heretofore proposed have been too complicated to find practical application and they also fail to positively lock the grip against removal.

The object of the present invention is to provide a simple and inexpensive handle construction which is not open to the above objections, and in which the grip can be readily assembled with its spindle and is freely revolvable thereon, while at the same time it is positively held against removal therefrom by fastening means entirely covered by the grip.

The invention is especially adapted for

handles with wooden grips, but it is not limited thereto.

One practical form which the invention may take is shown in the accompanying drawings, which illustrate a hand crank embodying the principles involved.

In these drawings: Figure 1 is a side elevation of the crank partly in section on the line 1—1 of Fig. 4; Fig. 2 is a plan partly in section on the line 2—2 of Fig. 1; Fig. 3 shows the coupling member in elevation on a larger scale and in expanded uncompressed condition; Fig. 4 is a transverse section on the line 4—4 of Fig. 1, but on a larger scale and Fig. 5 is a longitudinal section of a modified form of handle grip.

The metal crank 10 has a portion 11 constituting a spindle or pin which forms a handle part and upon which is revolvably secured the hollow handle grip 12, assumed in this instance to be of wood. At 13 the spindle is reduced in diameter for a distance sufficient to accommodate between the grip and spindle the resilient coupling member, which in the present example consists of a piece of stout spring wire, shaped more or less in the form of a U, with a transverse base portion or cross-piece 14, and arms 15. The reduced portion of the spindle is grooved at 16 to receive the base 14 of the coupling member, said base desirably being of such width that, as shown in Fig. 4, it is kept in the groove by the inner wall of the grip member. Moreover, by bending the arms 15 slightly as at 17, those portions adjacent the base 14 are made to lie closely adjacent and parallel to the reduced part of the spindle; while beyond the bends, the arms diverge and press strongly against the inner surface of the grip, the wire coupling being here shown as lying in a single plane to one side of the spindle axis. Shoulder 18 on the spindle provides a limiting abutment for the coupling member. The coupling member, though unattached either to the grip or the spindle, therefore has a locking engagement with both to prevent the grip being pulled off the spindle. This specific arrangement offers important advantages in the way of compactness and simplicity, but the construction is obviously capable of considerable variation within the scope of the invention.

In assembling the parts of the device here shown, the wire coupling member is placed

in the reduced portion 13 of the crank spindle with its base or cross-piece 14 lying in the groove 16. The hollow wooden grip member is then pushed on over the spindle into the position shown in Figs. 1 and 2, compressing and forcing toward each other the arms of the spring wire coupling. The outward pressure of the arms against the grip is such that if it be attempted to pull the grip off the spindle, the cross-piece 14 of the coupling member is forced against shoulder 18, causing the free ends of the coupling arms to bite deeper into the wood of the grip, whereby the parts are positively locked together against relative longitudinal movement, although they are free to turn with respect to each other, the coupling member turning with the grip. The ends of the spring arms may be pointed to facilitate partial entry into the wood, but this is not essential with wire of sufficient stiffness. The inner surface of the grip may optionally be shouldered or grooved to receive and lock the ends of the spring arms, and this, or some equivalent provision, is necessary where the grip is of metal instead of wood.

Fig. 5 shows such a grip 19 made of metal, and provided internally with the locking groove 20 adapted to receive the ends of the spring coupling.

It is evident that, in a handle device constructed in accordance with the invention, the coupling member is wholly inclosed by the grip member and is inaccessible after the parts are assembled.

What I claim is:

1. In a handle device, the combination of a spindle having a reduced portion, a handle grip on said spindle, and a resilient coupling member disposed in said reduced portion and covered by said grip, said coupling member being unattached either to the grip or to the spindle but arranged to limit longitudinal movement of the grip on the spindle in at least one direction while permitting the grip to turn on the spindle.

2. In a handle device, the combination of a spindle having a reduced portion, a handle grip on said spindle, a spring coupling member located in the reduced portion between the spindle and the grip and having a locking engagement with both though unattached to either, whereby relative longitudinal movement of the grip and spindle in one direction is substantially prevented while relative rotational movement is permitted.

3. In a handle device, the combination of a spindle having an abutment shoulder, a handle grip on said spindle and an approxi-

mately U-shaped spring wire coupling member between the spindle and the grip, but unattached to either, said coupling member bearing with its base against said shoulder and with its free ends against said grip, and locking the grip and spindle together against relative longitudinal movement while permitting their relative rotation.

4. In a handle device, the combination of a spindle having a reduced portion and a groove adjacent one end of said reduced portion, a handle grip on said spindle, a resilient coupling member inclosed between the grip and spindle but unattached to either, and having a transverse portion engaging said groove, and having arms extending toward the other end of said reduced portion and in locking engagement with said grip.

5. In a handle device, a spindle, a hand grip thereon, and coupling means wholly inclosed between said spindle and grip but unattached to either, said coupling means being arranged to positively lock the grip against longitudinal movement in one direction relative to the spindle, while permitting it to turn freely on the spindle.

6. In a handle device, the combination of a spindle having an abutment shoulder, a hand grip on said spindle, and a resilient coupling member arranged between the handle grip and the spindle but unattached to either, said coupling member being arranged to press against said grip and to revolve therewith, and to have sliding engagement with said abutment shoulder.

7. In a handle device, the combination of a spindle having abutment means, a hand grip mounted on said spindle and provided interiorly with abutment means, and a coupling member arranged between said grip and spindle but unattached to either and adapted to coöperate with both abutment means to resist removal of the grip from the spindle, while permitting the grip to turn on the spindle.

8. In a handle device, the combination of a spindle having an abutment shoulder, a handle grip mounted on said spindle and provided interiorly with a groove, and a spring coupling arranged between the grip and spindle but unattached to either and engaging both said groove and said abutment shoulder, whereby removal of the grip from the spindle is resisted, while relative turning movement of the grip and spindle is permitted.

In testimony whereof I hereunto affix my signature.

LEROY L. SALFISBERG

HOLDER FOR TALKING MACHINE RECORDS,
 #1,208,844-----J. J. Scully,
 Patented-December 19th, 1916.
 Filed-June 8th, 1915.

J. J. SCULLY.
 HOLDER FOR TALKING MACHINE RECORDS.
 APPLICATION FILED JUNE 8, 1915.

1,208,844.

Patented Dec. 19, 1916.

Fig. 4.

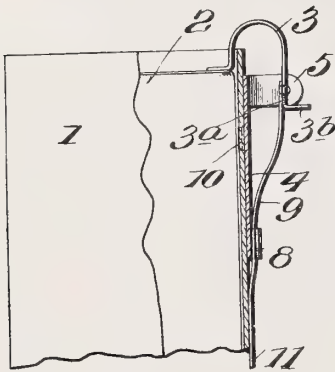


Fig. 1.

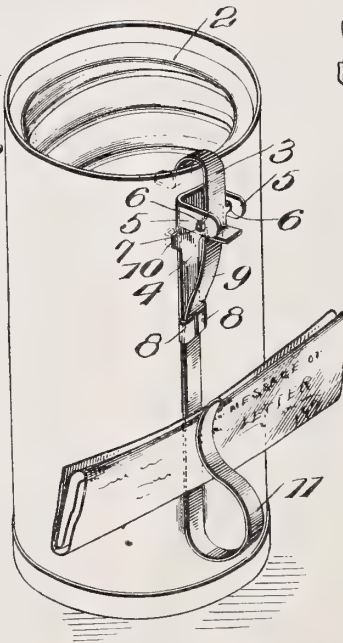


Fig. 5.

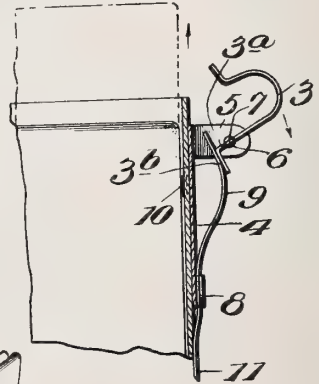


Fig. 2.

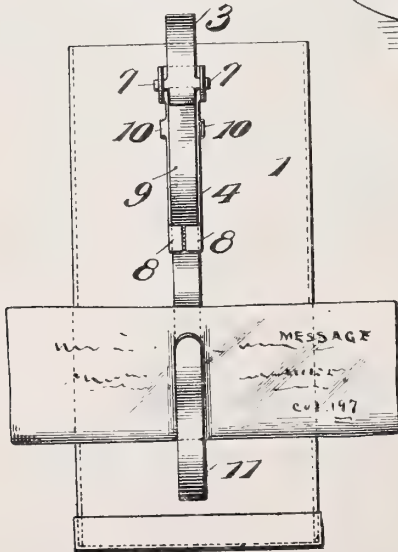
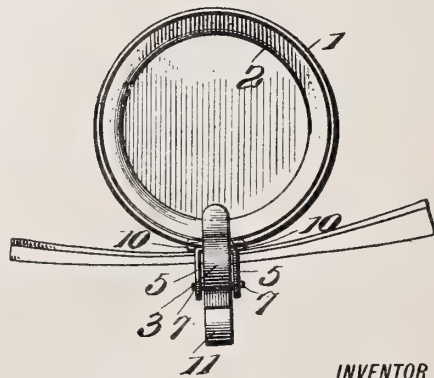


Fig. 3.



INVENTOR
John J. Scully
 BY *Mauro, Cameron, Lewis & Massie*
 ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN J. SCULLY, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

HOLDER FOR TALKING-MACHINE RECORDS.

1,208,844.

Specification of Letters Patent.

Patented Dec. 19, 1916.

Application filed June 8, 1915. Serial No. 32,939.

To all whom it may concern:

Be it known that I, JOHN J. SCULLY, a citizen of the United States of America, and a resident of Bridgeport, Connecticut, have invented a new and useful Improvement in Holders for Talking-Machine Records, which invention is fully set forth in the following specification.

This invention relates especially to cases or holders for talking machine records of the sort used for office dictation, but manifestly the invention is not limited to use for records of this character.

One object of the invention is to provide, in conjunction with a case or holder for a talking machine record, an improved latch for holding the record in place.

Another object is to provide, in conjunction with such a case or holder, a suitable means for receiving and holding a paper carrying a message to accompany the record.

A further object of the invention is to provide certain improved structural features which make possible a simple but at the same time advantageous device having as parts thereof both the latch and the message-holder.

Of the drawing, which illustrates the embodiment of the invention which I now deem preferable, Figure 1 is a perspective view, showing a record in place in the case and a message in the holder therefor; Fig. 2 is a side view; Fig. 3 is a top plan view; Fig. 4 is a fragmentary view, partly in vertical section, showing the latch and associated parts; and Fig. 5 is a view similar to Fig. 4, but showing the latch in another position.

Referring to the drawing, 1 represents the case for containing the record 2, the case being cylindrical and preferably a little longer than the record, as shown. I prefer to form the case of sheet steel or other metal, but it will be understood that, as it concerns several of the features of the invention, this is immaterial. The interior diameter of the case is slightly larger than the exterior diameter of the record to enable the record to be inserted without injury, and it will be understood that, if desired, the interior of the case can be suitably lined.

For holding the record in place, I provide a latch 3 which is pivoted at a point outside of the case and is shaped to extend down into the case and engage the record, as clearly shown in Fig. 4. The record should be firmly held to prevent not only endwise movement but also lateral movements which might cause it to rub against the walls of the case. However, the latch must not engage the record too strongly as the record is easily chipped or cracked. In order to provide for the exertion of a definite predetermined pressure on the record, the latch 3 is preferably formed of resilient sheet-metal.

4 is a carrier or bracket for the latch 3, this being secured to the case 1. Preferably the carrier 4 is formed of sheet-metal and is provided near its upper end with two outturned parallel ears 5, 5, which are perforated at 6, 6, to receive trunnions 7, 7 formed on the latch 3. By means of these trunnions, the latch 3 is pivotally supported as aforesaid.

Secured to the carrier 4, preferably by means of integrally formed tongues 8, 8, is a spring 9, which extends upward and engages the latch 3. The latch 3 is provided with two flat surfaces 3^a and 3^b at an angle to each other, the spring 9 contacting with one of these when the latch is in operative position, and contacting with the other of these when the latch is in inoperative position. Fig. 4 shows the spring 9 contacting with the surface 3^a to hold the latch in resilient contact with the record; and Fig. 5 shows the spring engaging the surface 3^b to hold the latch out of contact with the record to permit its removal from the case.

Preferably the carrier 4 is secured to the case by means of integrally formed tongues 10, 10 which project inward through suitable apertures in the case and are bent over flat against the inner case walls. In order that the inner parts of these tongues may not contact with and scratch the surface of the record, the tongues, together with the immediately adjacent parts of the case itself, are pressed outward to provide a substantially smooth inner surface, as clearly shown in Figs. 4 and 5.

Preferably there is provided a suitable

clip or holder 11 for engaging a paper carrying a message, which paper may be a correction strip. As shown, this holder is a strip of resilient sheet-metal doubled back upon itself to provide two normally contacting surfaces between which the paper can be pushed.

For the sake of simplicity and convenience, the spring 11 is secured to the element 4 which also carries the latch 3; and for the sake of further convenience and simplicity, the spring 11 is formed integrally with or as a continuation of the aforesaid spring 9. It will be observed that the one strip of metal 9—11 is gripped between its ends by the tongues 8, 8, and is held against any considerable angular movement by the engagement of its upper end with the two ears 5, 5.

It will be observed that, in addition to the case itself, but three pieces of metal are required. The piece 9—11 must be formed of spring metal, and the piece 3 is preferably so formed. However, the piece 4 which constitutes the carrier can be formed of softer metal adapted to be easily bent to form the tongues and ears.

What is claimed is:—

1. The combination of a case for holding a talking machine record, and a horizontally pivoted latch normally extending inwardly of the top of the case to yieldably engage the top of the record, the latch being movable about its pivotal axis outwardly to permit removal and insertion of the record.

2. The combination of a case for holding a talking machine record having a length less than that of the case, and a horizontally pivoted latch normally extending over the top of the case and downward to yieldably engage the top of the record, the latch being movable about its pivotal axis upward and outward to permit removal and insertion of the record.

3. The combination of a case for holding a talking machine record, a movably mounted latch normally extending inwardly of the top of the case to yieldably engage the top of the record, said latch being movable outwardly to permit removal and insertion of the record, and a spring for holding said latch in record-engaging position.

4. The combination of a case for holding a talking machine record, a horizontally pivoted latch normally extending inwardly of the top of the case to yieldably engage the top of the record, the latch being movable about its pivotal axis outwardly to permit removal and insertion of the record, and a spring for holding said latch in record-engaging position.

5. The combination of a case for holding a talking machine record, a movably mounted latch normally extending inwardly of the top of the case to yieldably engage the top

of the record, said latch being movable outwardly to permit removal and insertion of the record, and a spring for holding said latch either in record-engaging position or in out of record-engaging position.

6. The combination of a cylindrical case for holding a talking machine record, a latch having a permanent horizontal pivotal connection with the case, the said latch normally engaging the top of the record and being movable about its pivotal axis to permit removal and insertion of the record, and a spring supplemental to the latch and permanently mounted on the case for holding the latch in record-engaging position.

7. The combination of a cylindrical case for holding a talking machine record, a latch having a permanent pivotal connection with the case, the said latch normally engaging the top of the record and being movable about its pivotal axis to permit removal and insertion of the record, and a spring permanently mounted on the case for engaging the latch to hold it either in record-engaging position or out of record-engaging position.

8. The combination of a cylindrical case for holding a talking machine record, a latch having a permanent pivotal connection with the case and normally engaging the top of the record and having adjacent its pivot two flat surfaces at an angle to each other, the said latch being movable about its pivotal axis to permit removal and insertion of the record, and a spring permanently mounted on the case for engaging either of the said flat surfaces to hold the latch either in its record-engaging position or out of its record-engaging position.

9. The combination of a case for holding a talking machine record, a sheet-metal bracket having integrally formed tongues which extend inward through perforations in the case and are bent over and pressed into the case wall to be flush with the inner surface thereof, and a latch mounted on the bracket and movable into or out of engagement with the record.

10. The combination of a case for holding a talking machine record, a sheet-metal bracket having integrally formed tongues extended through perforations in the case and bent over therein, a latch mounted on the bracket and movable into and out of engagement with a record in the case, and a spring mounted on the bracket and engaging the latch.

11. The combination of a case for holding a talking machine record, a latch for engaging the record, a sheet-metal bracket on which the latch is pivotally mounted, tongues formed integrally with the bracket and extending inward through perforations in the case and bent over, other tongues formed integrally with the bracket, and a

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spring held in place by the second said tongues and engaging the latch to hold it in record-engaging position.

5 12. The combination of a case for holding a talking machine record, a pivoted latch adapted to be moved into or out of engagement with the record, and a single piece of spring-metal engaging at one place with the latch to hold it in its record-engaging position and shaped at another place to engage a
10 paper carrying a message.

13. The combination of a case for holding a talking machine record, a bracket mounted on said case, a latch pivoted on said
15 bracket and adapted to be moved into and out of engagement with the record, and a spring mounted on said bracket, said spring

engaging said latch at one end and being doubled upon itself at the other end.

14. The combination of a case for holding 20 a talking machine record, and a movably mounted latch normally extending inwardly of the case to yieldably engage the record and thereby prevent movement of the record within the case in any direction, said latch 25 being movable outwardly to permit removal and insertion of the record.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN J. SCULLY.

Witnesses:

L. S. EASTMAN,
JOHN S. GRIFFITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



TALKING MACHINE NEEDLE MAGAZINE,
#1,208,900-----M. Blackman,
Patented-December 19th, 1916.
Filed-December 4th, 1915.

1,208,900.

Fig. 1

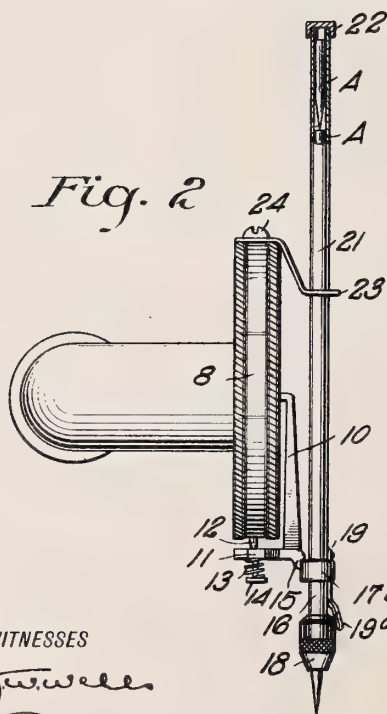


Fig. 2

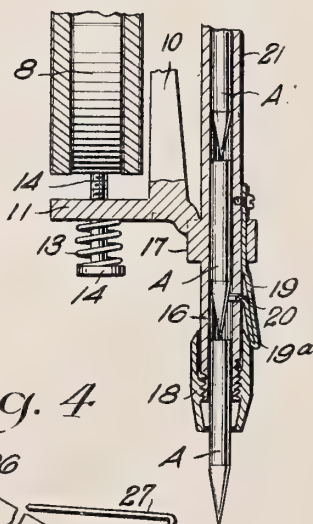


Fig. 3

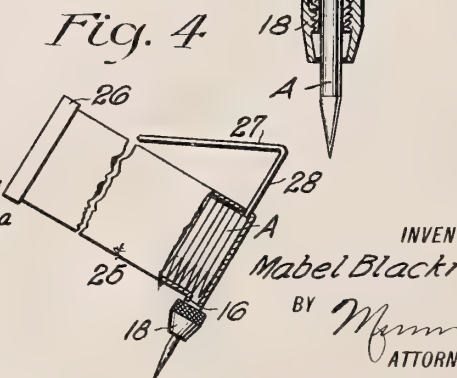


Fig. 4

Jewell
Edmunds

Mabel Blackmar
6 BY *Mumbe*
ATTORNEYS

UNITED STATES PATENT OFFICE.

MABEL BLACKMAN, OF NEW YORK, N. Y.

TALKING-MACHINE-NEEDLE MAGAZINE.

1,208,900.

Specification of Letters Patent.

Patented Dec. 19, 1916.

Application filed December 4, 1915. Serial No. 65,014.

To all whom it may concern:

Be it known that I, MABEL BLACKMAN, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Talking-Machine-Needle Magazine, of which the following is a full, clear, and exact description.

Among the principal objects which the present invention has in view are: to provide means for carrying a number of needles for use on talking machines, and to regulate the delivery thereof; and to provide a simple device which may be employed as an attachment to sound boxes of conventional construction for talking machines.

Drawings.—Figure 1 is a side view of a fragment of a tone tube and a sound box of conventional construction mounted thereon and equipped with a magazine constructed and arranged in accordance with the present invention; Fig. 2 is an end view of the same; Fig. 3 is an enlarged detail view in section showing a lower end fragment of the magazine and a portion of the sound box on which the same is mounted; Fig. 4 is a detail view, partly in section, showing a modified form of the magazine.

Description.—As seen in the drawings, a sound box 8 has a diaphragm 9, to the center of which is attached the vibrator 10. The vibrator 10 is rigidly connected with a rocking table 11, which is supported on the knife blades 12 and held pressed thereon by the springs 13 and the retaining screws 14 holding the said springs. Extended from the table 11, is a bracket 15, to which is directly and rigidly connected the vibrator 10. Also directly and rigidly connected with the bracket 15, is a chuck 16. The chuck 16 is a split-ended tube, having a collar 17 and a chuck head 18. An upward continuation of the tube forming the chuck 16, is the magazine 21.

The magazine 21 is a straight tube wherein are placed the needles A used in a talking machine employing record disks. The magazine is made of any suitable length and is closed at the upper end thereof by a screw-threaded cap 22. The cap 22 is removed whenever it becomes necessary to charge the magazine 21, and is replaced after said magazine is charged.

To steady the magazine without restraining the vibration thereof which is imparted

to the vibrator 10 from the needle in the chuck 16, a bracket 23 is provided mounted on the sound box, using for this purpose, a screw 24, or other suitable device. The opening in the bracket 23 is such as to permit the magazine to oscillate in said opening.

The feed of the needles is controlled by a spring check 19, the crocheted end 20 of which is extended inside the chuck 16, a suitable opening being formed to pass the same. Normally the end 20 is disposed in the path of the needles A, to engage and prevent the downward travel of the same.

To remove the check 19 and the end 20 from engagement with the needles successively, the upper end of the chuck head is beveled to wedge under the overhang 19^a of the said check. This action is completed only when the jaws of the chuck 16 are closed. This prevents the needles from passing through the chuck. To adjust each needle, the head 18 is manipulated to partly open the jaws of the chuck 16 and to allow the needle to pass therethrough. The operator catches and adjusts the needle when the end extends from the chuck. When the head 18 is thus manipulated to release the needle being adjusted, the end 20 is permitted to engage the next succeeding needle. The said succeeding needle is thus held while the needle being arranged for service is being adjusted.

Operation.—Having a magazine constructed as above described and as shown in the accompanying drawings, the operation of filling the same begins by setting up the chuck head 18 sufficiently to prevent the passage of needles A therethrough. The first needle dropped will be arrested at the bottom of the magazine by the end 20, the spring 19 having been advanced so that the end engages said needle. When the magazine has become completely charged, the cap 22 is replaced so that the sound box 8 may be moved to any angle without fear of dumping or losing the needles contained in the magazine. The end 20 is now retracted and the chuck 16 arrests the first of the needles A. The head 18 is manipulated to allow the said needle to extend beyond the end of the chuck to the required or adjusted position. The spring 19 and end 20 are then released, the latter engaging the second needle, while the chuck 16 grasps the first, or needle to be used, holding the same firmly in service

position. When it becomes necessary to change the needle, the head 18 is retracted to free the exposed needle A. The needles in the column above the exposed needle are prevented from falling by engagement of the end 20 with the succeeding needle A. To adjust the succeeding needle to the playing position, the operator, after first screwing up the head 18 to close the chuck 16, retracts the spring 19 to release the column of needles, which then descends until the lowermost member of the column is engaged by the chuck 16.

The magazine 21 may be extended to any suitable length to carry any desired number of needles. It is obvious that needles may be quickly emptied from or placed within the magazine, and that after having been so placed the renewal of the needles will be accomplished at a great saving of time and with added facility.

Modification.—In the modified form of the invention shown in Fig. 4 of the drawings, the magazine 21 is replaced by a case 25 longitudinal in cross section. The case 25 has a closing cap 26, which is removed when the magazine is to be charged with the needles A. Resiliently mounted on the case 25, is a spring 27, the thrust end 28 whereof is extended into the path of the lower end needle A. When the thrust end 28 is depressed, it bears upon the end needle to move the same into the chuck for holding the said needle in service, the chuck head 18 having been released to permit the expansion of the jaws of said chuck.

While the end needle is being delivered to the chuck and chuck head 18, it will be

noted that the end 28 extends into the path of the succeeding needles and prevents the delivery thereof until the end 28 having been released, the spring 27 lifts it to the normal position beyond the path of the said needles, and as shown in Fig. 4 of the drawings.

Claims:

1. An apparatus as characterized comprising an open-ended tubular magazine; a chuck in open communication with and disposed at the delivery end of said magazine; a head for contracting and expanding said chuck; a resilient check member mounted on said magazine and having a portion thereof extending within the same to normally support a column of needles in said magazine; and means lifting said check member from engagement with said needles, said means embodying said head and an inclined portion of said check member, whereby said check member is lifted when said head closes said chuck.

2. In combination with a sound box, a magazine comprising a diaphragm vibrator having rigidly mounted thereon, a contractible chuck; a contracting chuck head for said chuck; an elongated tubular magazine structurally connected with said chuck and supported thereby; an additional support embodying a bracket rigidly secured to said sound box; and a closure cap for said magazine.

MABEL BLACKMAN.

Witnesses:

E. F. MURDOCK,
G. H. EMSLIE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

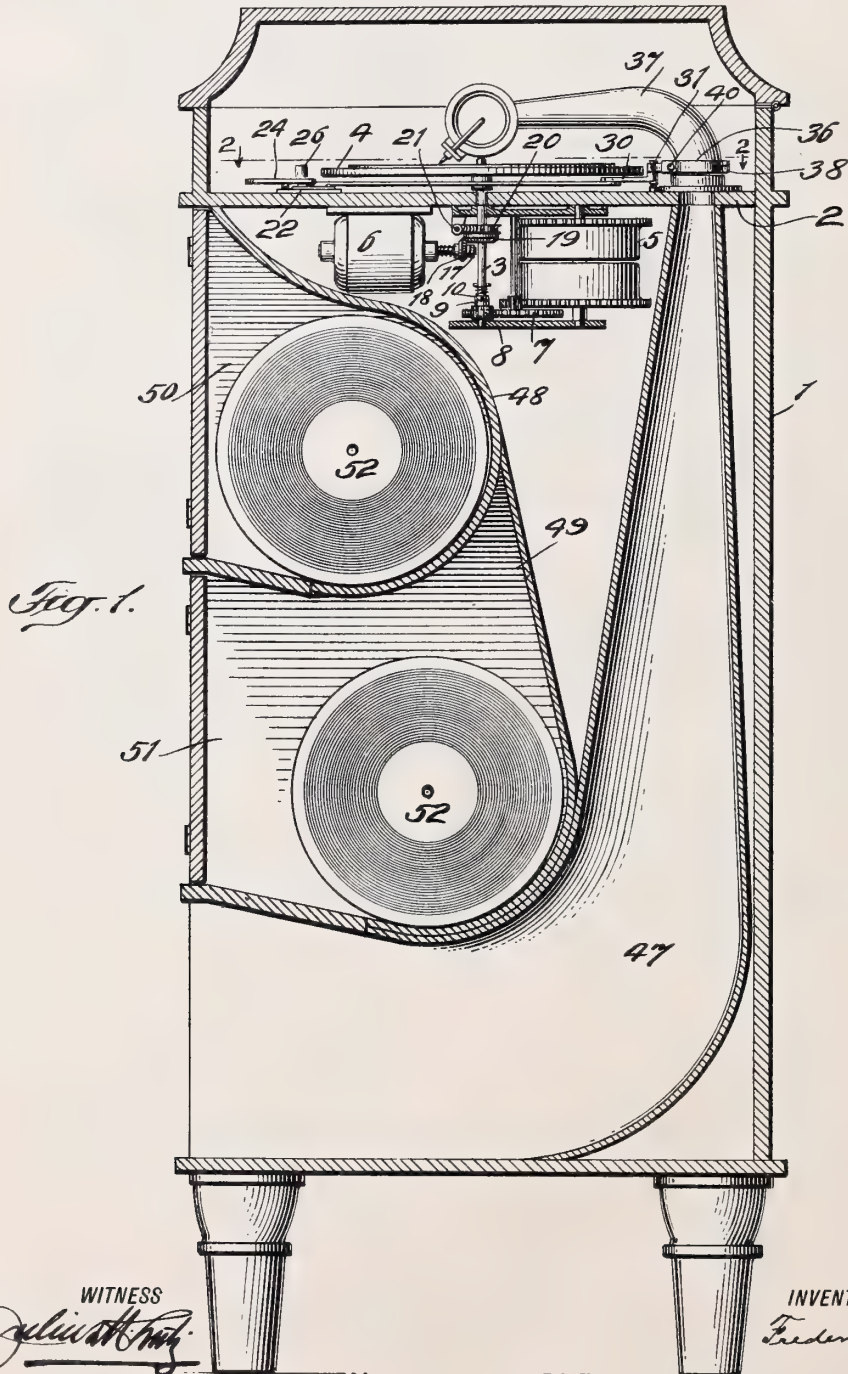
DRIVING MECHANISM FOR PHONOGRAPHS,
#1,209,307-----F. Kraft,
Patented-December 19th, 1916.
Filed-February 19th, 1916.

F. KRAFT.
DRIVING MECHANISM FOR PHONOGRAPHS.
APPLICATION FILED FEB. 19, 1916.

1,209,307.

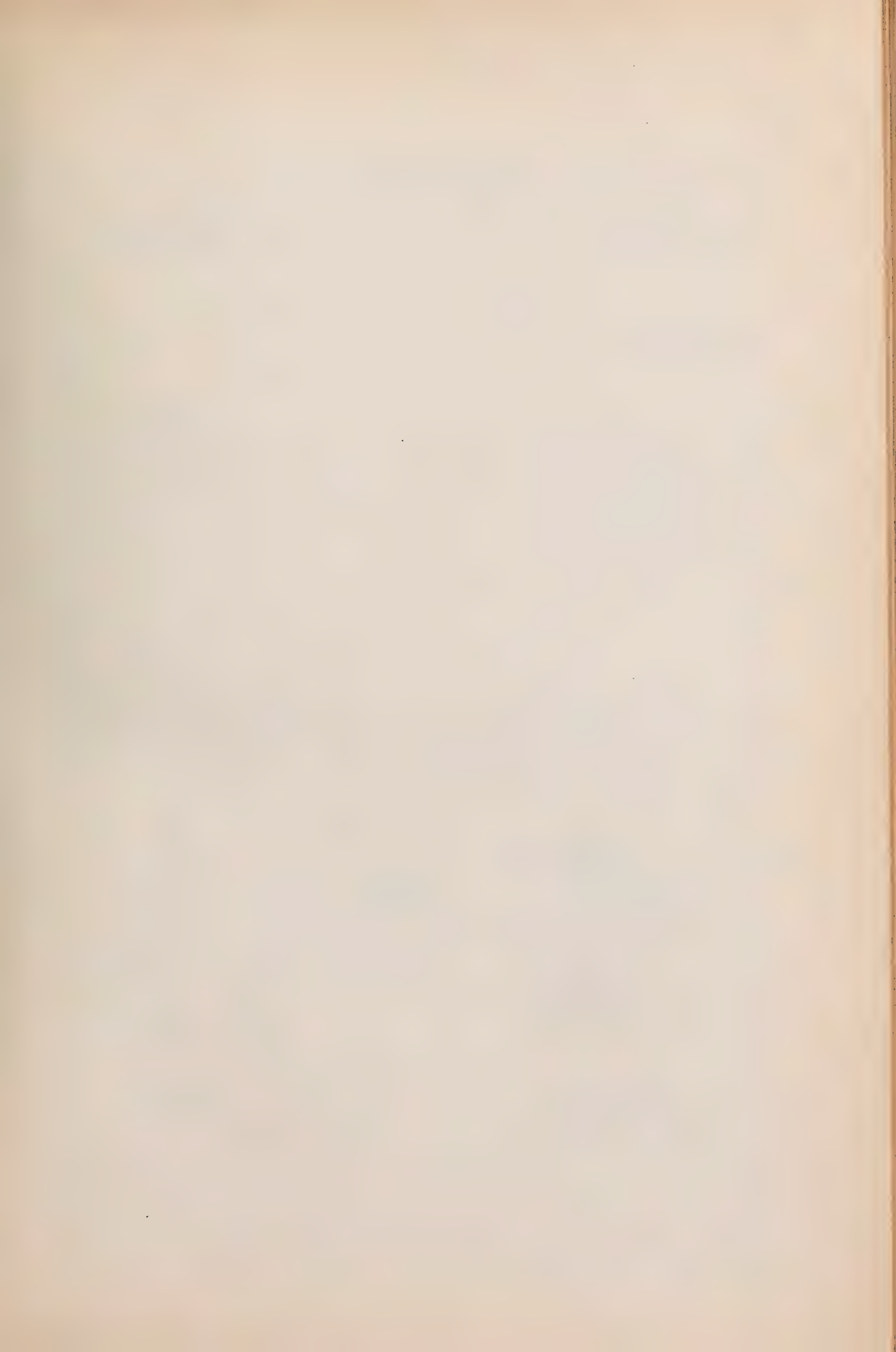
Patented Dec. 19, 1916.

2 SHEETS—SHEET 1.



WITNESS
Julius H. Kraft

INVENTOR
Frederick Kraft
BY *Frank H. Kraft*
ATTORNEY

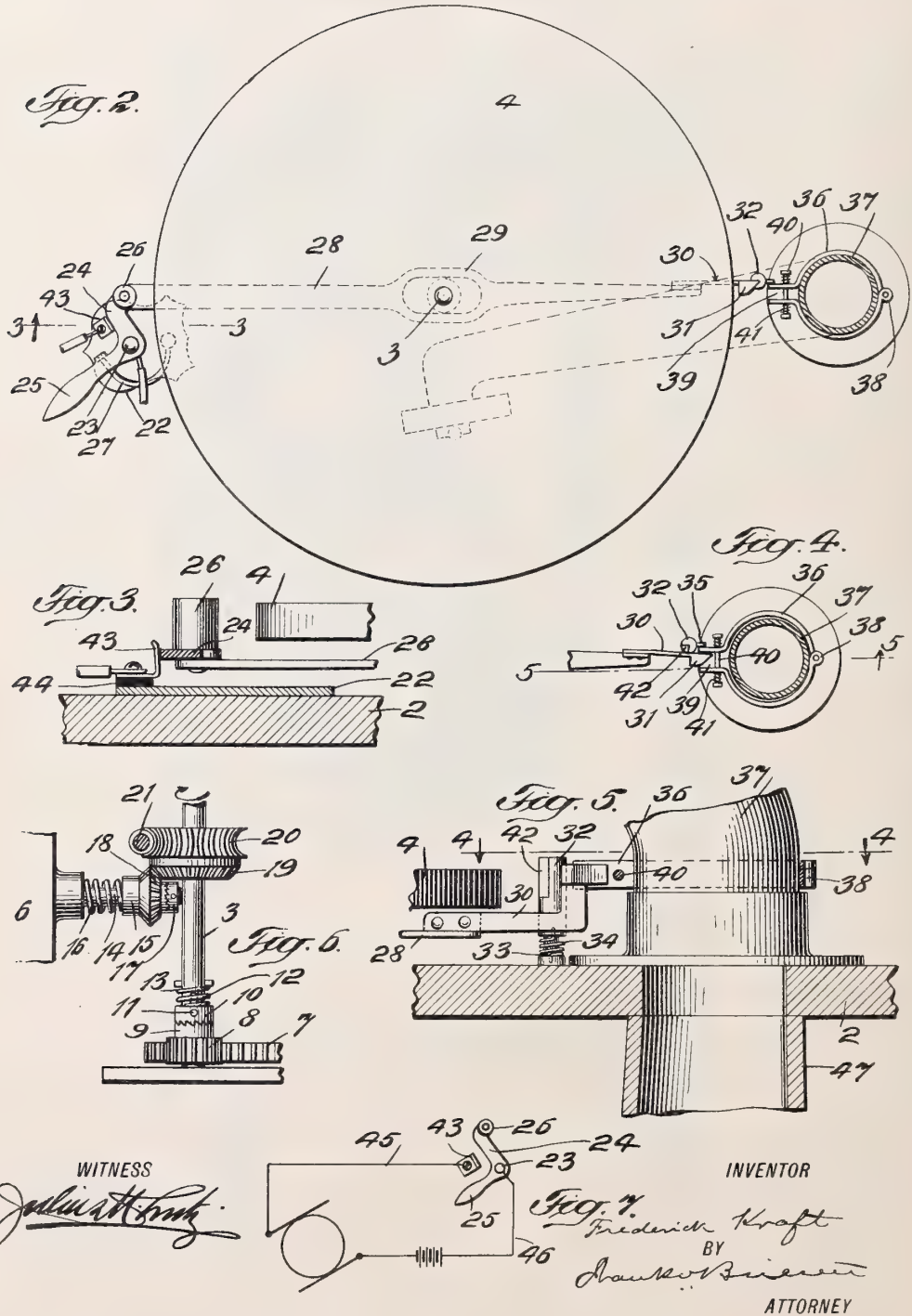


F. KRAFT.
DRIVING MECHANISM FOR PHONOGRAPHS.
APPLICATION FILED FEB. 19, 1916.

1,209,307.

Patented Dec. 19, 1916.

2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

FREDERICK KRAFT, OF HIGHWOOD PARK, NEW JERSEY.

DRIVING MECHANISM FOR PHONOGRAPHS.

1,209,307.

Specification of Letters Patent.

Patented Dec. 19, 1916.

Application filed February 19, 1916. Serial No. 79,247.

To all whom it may concern:

Be it known that I, FREDERICK KRAFT, a citizen of the United States, and a resident of Highwood Park, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Driving Mechanisms for Phonographs, of which the following is a specification.

This invention relates to a driving mechanism of novel construction for phonographs, and more particularly to novel means for operating the turn table by either a mechanical or an electric motor, in such a manner that if either one of the motors is operated, the other motor is automatically cut out.

In the accompanying drawing: Figure 1 is a vertical section of a phonograph having a driving mechanism embodying my invention; Fig. 2, a horizontal section on line 2—2 Fig. 1, Fig. 3, a vertical section on line 3—3 Fig. 2; Fig. 4, a horizontal section on line 4—4 Fig. 5; Fig. 5, a vertical section on line 5—5 Fig. 4; Fig. 6, a detail of the turn table driving mechanism, and Fig. 7, a wiring diagram.

The cabinet 1 of the phonograph is furnished with the usual top 2, through which passes the spindle 3 of the turn table 4. From top 2 is suspended a spring motor 5 and also an electric motor 6, from either of which the spindle 3 may be driven, the construction being such that on actuating either one motor the other motor is automatically uncoupled, so that any manual uncoupling of the idle motor is entirely obviated. The means for effecting this result are as follows: The operating gear wheel 7 of the spring motor 5 engages a pinion 8 carried by a toothed clutch jaw 9 which is loose on spindle 3. Jaw 9 is adapted to be engaged by a correspondingly toothed jaw 10, which is held slidably but not rotatably on spindle 3, by a pin 11 and groove 12, the jaws 9, 10 being closed upon each other by means of a spring 13. It will be seen that when the spring motor 5 is actuated, it will by wheels 7, 8 and clutch 9, 10 turn spindle 3 in the direction of the arrow (Fig. 6).

The shaft 14 of the electric motor carries 50 a rotatable and slidable toothed clutch jaw 15 which by spring 16 is adapted to be held in engagement with a correspondingly toothed jaw 17 fast on end of shaft 14. Upon jaw 15 is fast a bevel gear wheel 18, 55 engaging a corresponding wheel 19 fast on spindle 3. The latter also carries a worm wheel 20 engaging the shaft 21 of a governor (not shown) in the usual manner.

When spring motor 5 is actuated as previously stated, wheel 19 will turn wheel 18, 60 so as to correspondingly turn jaw 15. But this jaw will ride idly over the teeth of jaw 17 so that the electric motor is entirely cut out. 65

When the electric motor is started, it will by closed clutches 15, 17 and wheels 18, 19 drive spindle 3. In this case, toothed jaw 10 will ride idly over jaw 9, so that the spring motor is cut out. 70

Thus it will be seen that the turn table may be operated by either motor, without first uncoupling the other motor.

Means are provided for braking the turn table at the end of the record, the construction being such that the brake is automatically set at the end of the inward sweep of the tone arm. This sweep varies in length for different lengths of records, and means have therefore been devised, for causing the 80 brake to be correctly set irrespective of the length of the tone arm sweep. In other words, the brake will be automatically applied on records of greater as well as of less length, whenever the piece of music is finished. 85

The means for effecting the above result are as follows: To top 2 there is secured, a plate 22 to which is pivoted at 23, a brake lever 24, having a handle 25. Lever 24 is 90 provided with a brake shoe 26, of suitable construction which is adapted to be projected against the edge of the turn table 4, by means of a spring 27, which is shown to be secured at one end to plate 22 and at the 95 other end to handle 25. To lever 24 there is pivoted one end of a rod or brake controlling member 28 passing diametrically beneath

turn table 4, and having an elongated eye 29 for the accommodation of spindle 3. The other end of rod 28, is provided with a spring arm 30, to which is secured a beveled head 31 constituting a spreading bolt. This head is adapted to engage an abutment comprising a notched sleeve 32 rotatably mounted upon pin 33, that extends upwardly from top 2, the sleeve being influenced by a spring 34. Sleeve 32 is provided with a tail piece 35 which is adapted to be engaged by a split collar or tripping member 36 encircling the tone arm 37. This collar is formed of two sections hingedly connected at one of their ends as at 38, while their spaced other ends are bent outwardly as at 39, one of such ends constituting a tripper for tail piece 35. Through ends 39 passes a pin 40, which by means of springs 41, has a tendency to contract the collar upon the tone arm.

The operation is as follows: When the machine is playing, head 31 engages notch 42 of sleeve 32, which will cause rod 28 to be so advanced, against action of spring 27, that brake 26 is held off turn table 4 (Fig. 1). When the tone arm has reached the end of its path, tripper 39 will strike tail 35, so as to turn sleeve 32 (against action of spring 34) and dislodge head 31 from notch 42, the sleeve being by its spring 34 immediately returned to its normal position, after this dislodgment has been effected. The release of the head 31 from the sleeve 32, will effect the release of rod 28, so that spring 27 will now retract the same and swing lever 24 inward to carry brake shoe 26 against turn table 4. As soon as the head 31 has relinquished sleeve 32, it will pass between the ends 39 of collar 36 (Fig. 4) and thus spread the latter against action of springs 41, the collar being thus loosened upon the tone arm 37 but being locked in position by the interposition of the head 31. A new record is now fitted upon the turn table and the tone arm is swung inward so that the stylo is brought opposite the end of such new record, the movement of the tone arm being not participated in by the collar. The brake is released by hand lever 25, thus pulling head 31 out of collar 36, and causing the latter to be again tightened upon the tone arm by springs 41, while the head will become re-engaged by sleeve 32. The motor is started and the tone arm is swung to the beginning of the record carrying the collar 36 with it, whereupon the piece is played and the operation described is repeated.

It will be seen that the collar 36 will trip the brake controlling means, as soon as the tone arm has reached the end of its path and that the collar will be set automatically in such a manner that it will be carried in due time against the brake controlling means, irrespective of the length of the tone arm

stroke. In this way, the brake will be promptly applied at the end of longer as well as of shorter records.

In case the turn table is operated by an electric motor, the brake may be so connected to the motor that the latter is automatically started as soon as the brake is taken off. For this purpose there is provided, a contact 43, which is separated from plate 22 by insulation 44, and is connected to motor 6 by wire 45 (Fig. 7), while a second wire 46 leads from lever 24 through the source of power to the motor. When the brake is off, the circuit will thus be closed, and the motor started.

The amplifying horn 47 is mounted within the cabinet 1, in the peculiar manner shown in Fig. 1. That is to say, it extends first downward along the back of the cabinet, and then forward along the bottom of the cabinet, so as to open with its belled mouth at the lower portion of the cabinet front. In this way, the entire upper front portion of the cabinet, *i. e.* that portion which is located within the bend of the horn, remains vacant, and may thus be utilized for the formation of a number of record receiving compartments. As shown, the space is divided by walls 48 and 49 into an upper compartment 50 and a lower compartment 51, adapted to receive two separate rows of records 52, so that in this way, the capacity of the cabinet is thoroughly utilized. It is obvious, however, that the peculiar arrangement of the compartment shown may be readily varied, without departing from the spirit of my invention.

I claim:

1. A driving mechanism for phonographs comprising a turn table, a spindle depending therefrom, a spring motor and an electric motor, both coupled to the spindle, and means controlled by the spindle for cutting out the electric motor when actuated by the spring motor.

2. A driving mechanism for phonographs comprising a turn table, a spindle depending therefrom, a spring motor and an electric motor, both coupled to the spindle, and means controlled by the spindle for cutting out the spring motor when actuated by the electric motor.

3. A driving mechanism for phonographs comprising a turn table, a spindle depending therefrom, a spring motor and an electric motor, both coupled to the spindle, and means controlled by the spindle for cutting out either one motor when actuated by the other motor.

4. A driving mechanism for phonographs comprising a turn table, a spindle depending therefrom, a spring motor, clutch-controlled coupling means between said motor and spindle, an electric motor, and clutch-

controlled coupling means between said last
named motor and spindle, one of said clutch-
controlled coupling means being in opera-
tive engagement while the other is in slid-
5 able engagement.

5. A driving mechanism for phonographs
comprising a turn table, a spindle depend-
ing therefrom, a spring motor, a clutch hav-
ing a first member intergeared with the

spring motor and a second spring-controlled 10
member slidable on the spindle, an electric
motor, a shaft on said motor, and a clutch
having a first spring-controlled member that
is slidable on the shaft and is intergeared
with the spindle, and a second member fast 15
on the shaft.

FREDERICK KRAFT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

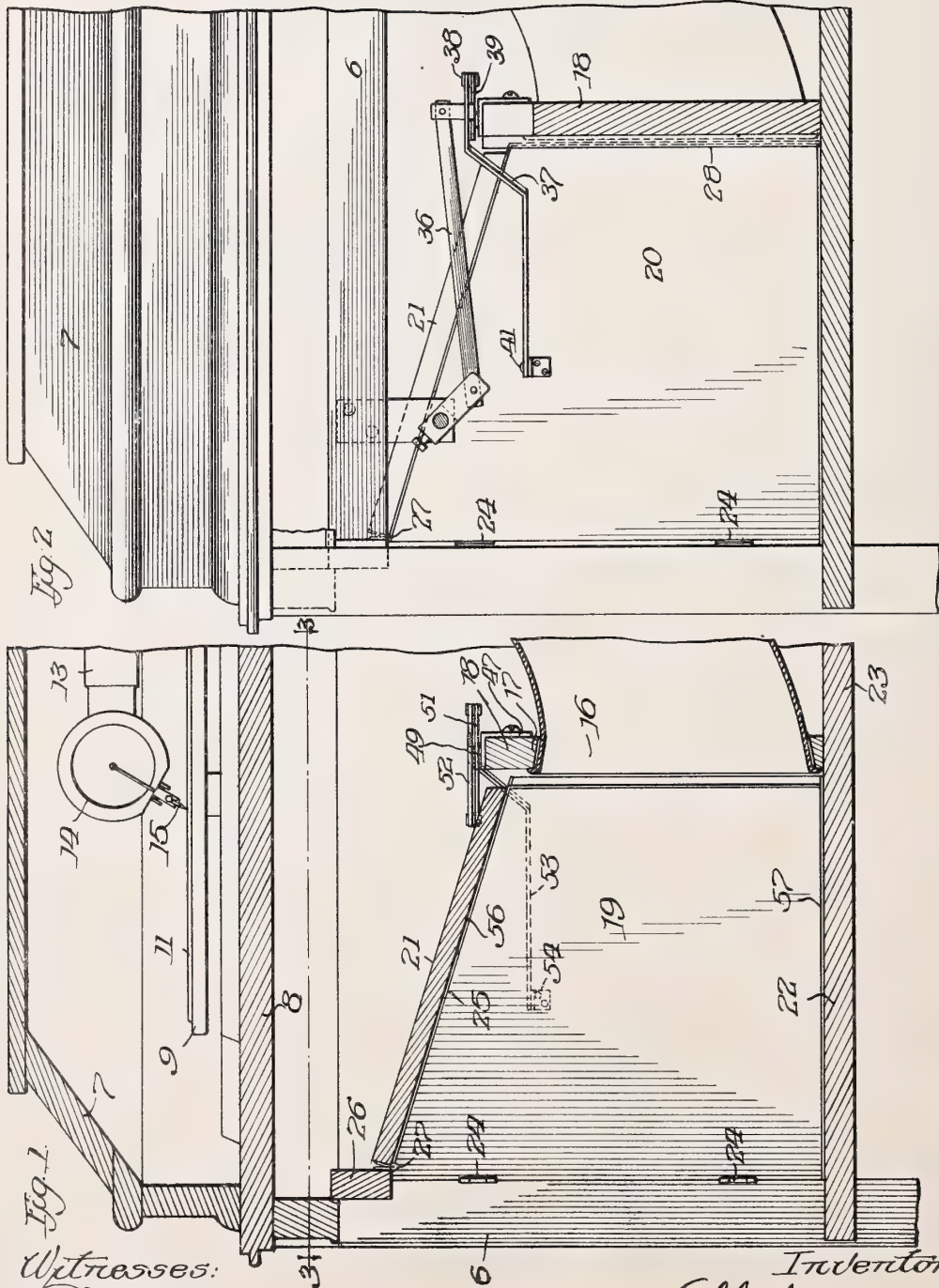
TALKING MACHINE AMPLIFIER,
#1,209,441-----A. A. Huseby,
Patented-December 19th, 1916.
Filed-July 3rd, 1916.

A. A. HUSEBY.
TALKING MACHINE AMPLIFIER.
APPLICATION FILED JULY 3, 1916.

1,209,441.

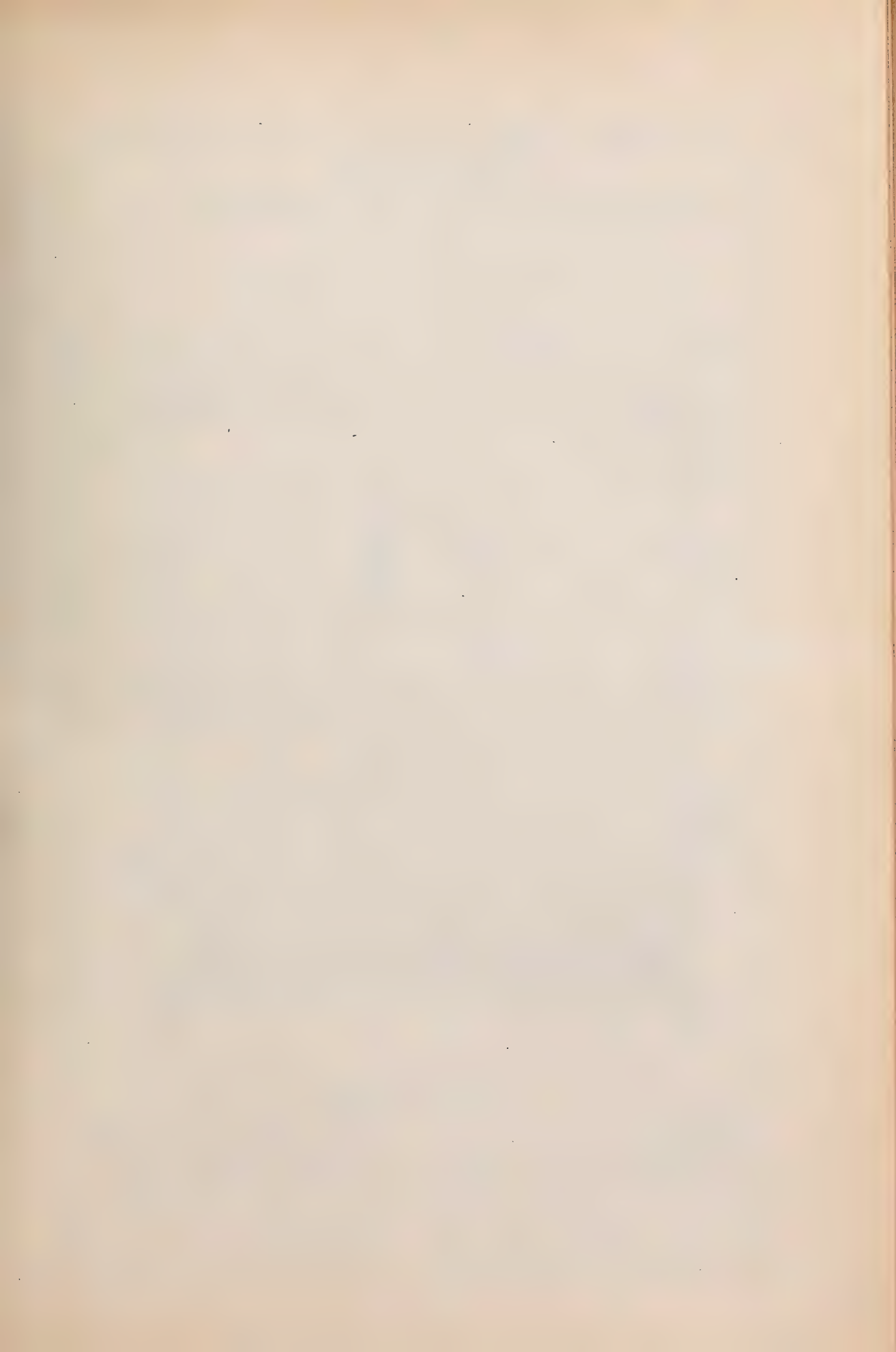
Patented Dec. 19, 1916.

2 SHEETS—SHEET 1.



Witnesses:
Ed. Larson
C. H. Rossoner.

Inventor:
Albert A. Huseby
Pond & Wilson Attys

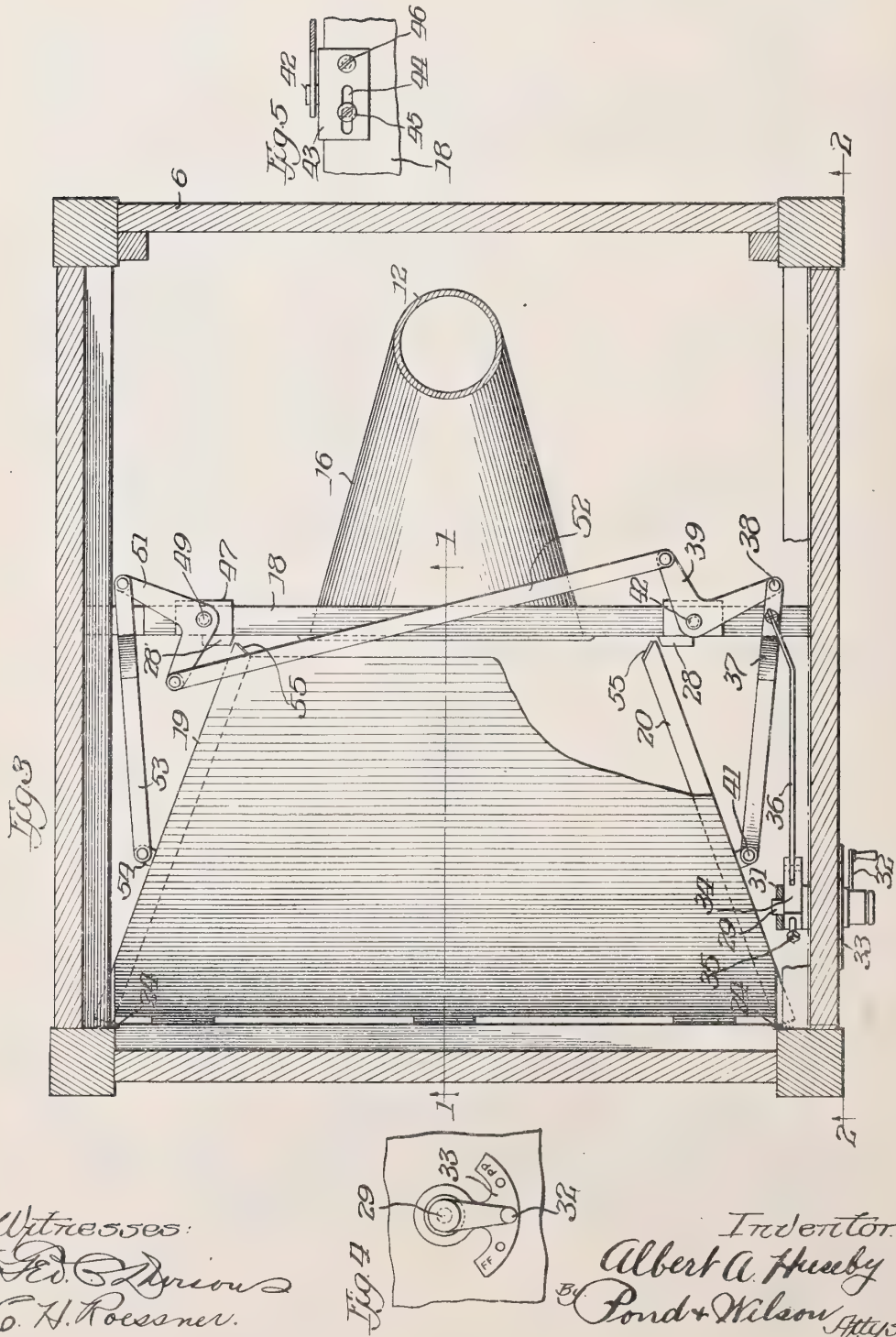


A. A. HUSEBY.
TALKING MACHINE AMPLIFIER.
APPLICATION FILED JULY 3, 1916.

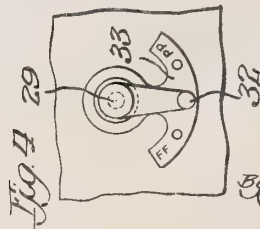
1,209,441.

Patented Dec. 19, 1916.

2 SHEETS—SHEET 2.



Witnesses:
Ed. A. Brown
C. H. Roessner.



Inventor:
Albert A. Huseby
By Pond & Wilson Attys

UNITED STATES PATENT OFFICE.

ALBERT A. HUSEBY, OF CHICAGO, ILLINOIS.

TALKING-MACHINE AMPLIFIER.

1,209,441.

Specification of Letters Patent.

Patented Dec. 19, 1916.

Application filed July 3, 1916. Serial No. 107,296.

To all whom it may concern:

Be it known that I, ALBERT A. HUSEBY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Talking-Machine Amplifiers, of which the following is a specification.

This invention relates in general to talking machines and has more particular reference to the amplifier or tone modulator, by means of which the tones produced by the machine are regulated or modulated to any desired degree of loudness or softness.

One of the primary objects of this invention is to provide an improved construction of amplifier which can be readily controlled and adjusted to yield loud and soft tone effects by varying the volume of the sound waves transmitted thereby.

Another object of the invention is to provide an amplifier which shall be wholly contained within the case of the talking machine and which will decrease the loudness of the tones produced by diverting a portion of the sound waves into the case or cabinet of the instrument so that only such proportion of the sound waves are transmitted directly from the machine as are required to give the desired tone effects.

Another object is to provide an amplifier and adjusting mechanism therefor which will be simple in construction, cheap to manufacture, easy to operate, and accurate and durable in use.

For the purpose of facilitating an understanding of my invention I have illustrated on the accompanying drawings one practical and preferred embodiment thereof from an inspection of which, when considered in connection with the following description, the invention and its mode of operation should be readily appreciated.

Referring to the drawings, Figure 1 is a fragmentary sectional view taken on the line 1—1 of Fig. 3 through a talking machine embodying my invention; Fig. 2 is a side elevation partially in section on the line 2—2 of Fig. 3 of the machine shown in Fig. 1; Fig. 3 is a horizontal sectional view on the line 3—3 of Fig. 1; Fig. 4 is a detail view of the manually operable regulating device; and Fig. 5 is a detail view showing one of the bell crank lever mountings.

On the drawings reference character 6 designates as an entirety the upper portion

of the box or cabinet in which the principal parts of the mechanism are housed, and 7 designates the hinged lid or cover for the cabinet. Upon the top wall 8 of the case is mounted the usual turntable or rotatable support 9 upon which the records 11 are positioned to be reproduced. The motor and the controlling mechanisms therefor, which are carried by the lower face of the wall 8, are not shown in the present case, since these parts may be of any well known or preferred construction.

The sound tube in the present instance preferably comprises a generally upright portion 12 to the upper end of which is rigidly connected a horizontally extending portion 13, commonly known as the tone arm, which has flexibly mounted at its free or forward end a sound box 14 carrying a stylus 15 adapted to engage the spiral groove of the record disk 11. The vertical portion 12 of the sound tube is curved forwardly at its lower end and is flared outwardly to provide the delivery mouth 16 which projects through an opening 17 in a transversely disposed partition 18. The sound tube may be supported in any suitable manner but preferably it is carried upon a pivotal support (not shown), the pivotal axis of which is arranged rearwardly of the tube and substantially coaxial with the center of the opening 17 and the mouth 16 so that when the upper end of the sound tube is moved laterally across the record disk the lower end or mouth 16 will simply oscillate in the opening 17 about its central axis.

The features thus far described are more fully shown and explained in detail in certain prior applications, but it is not believed to be necessary to enter at length into a discussion of these features in this case which is concerned more particularly with the amplifier, which will now be described.

The amplifier is mounted forwardly of the partition 18 to receive the sound waves delivered from the mouth 16 of the sound tube, and comprises a pair of side walls 19 and 20, a top wall 21, and a bottom wall 22 which may consist of a portion of the floor member 23. The side walls are hinged at their outer vertical edges to frame members of the cabinet as indicated at 24 and their upper edges are inclined downwardly and inwardly as indicated at 25 and form a support upon which the top wall 21 rests, this

wall being hinged along its outer horizontal edge to a frame member 26 of the cabinet, as shown at 27. The side walls 19 and 20 are of such length that they will engage
 5 with the transverse partition 18 before they are swung to a position parallel with the side walls of the cabinet, but for the purpose of preventing the outer edges of the side walls 19 and 20 from wedging against the
 10 transverse partition 18 I have mounted upon this partition stop blocks 28 which limit the outward swinging movement of the inner ends of these walls.

The mechanism by means of which the
 15 swinging walls 19 and 20 may be adjusted to position their inner ends in any desired location with respect to the sound tube, comprises a shaft 29 projecting through one of the side walls of the cabinet and sup-
 20 ported at its inner end in a bracket bearing 31, the outer end of the shaft being provided with a handle 32 adapted to travel across the face of an indicator plate 33 carrying piano and forty designations as indicated
 25 in Fig. 4. A radially projecting arm 34 attached to the shaft 29 by a setscrew 35 is connected at its outer end with a link 36 which in turn is attached at its other end to a link 37 near its pivotal connection 38
 30 with a bell crank 39. The link 37 is attached at its other end at 41 to an ear projecting from the outer face of the swinging wall 20. The bell crank lever is pivotally mounted upon a pin 42 carried by an angle bracket
 35 43 mounted upon the upper edge of the transverse partition 18. In order that this angle plate may be adjusted to the requisite position it is provided with an elongated slot 44 through which a wood screw 45,
 40 threaded into the partition, passes. Another wood screw 46, passed through the plate and into the partition, securely holds the plate against displacement. Another angle plate 47, substantially identical in construction
 45 with the plate 46, is similarly adjustably fastened to the partition 18 near its other end and has pivotally mounted upon a pin-
 50 tle 49 a bell crank lever 51 similar to the bell crank 39. These bell cranks are connected so as to move in unison by a trans-
 55 verse link 52 and the outwardly extended arm of the bell crank 51 is connected by a link 53 with an ear 54 extending laterally from the swinging side wall 19. It will
 60 thus be manifest that by moving the handle 32 in one direction or the other the inner ends of the walls 19 and 20 will be simultaneously and uniformly moved toward or from each other, depending upon the direc-
 65 tion of movement of the handle 32. When the parts are in the position shown in Fig. 3 the mouth of the sound tube discharges fully into the amplifier which receives and transmits through the open front wall of the cabinet all the sound waves emitted by

the sound tube. When, however, the side walls 19 and 20 of the amplifier are swung inwardly toward each other the receiving mouth of the amplifier will be more or less contracted both horizontally and vertically
 70 so that the sound waves from the sound tube will pass only partially therethrough, a portion of the sound waves being diverted through the interior of the cabinet so that the volume of sound emitted will be reduced
 75 and the tone effect correspondingly softened. By swinging the side walls of the amplifier inwardly until their free ends practically meet substantially the entire volume of sound is diverted into and through the in-
 80 terior of the cabinet, producing a very soft and muffled tone effect. In order to prevent any jarring or harsh noises in case the inner ends of the amplifier side walls are swung into substantial contact with each other
 85 these ends are preferably equipped with felt strips 55, and similarly, to prevent noises which might result from contact of the swinging side walls with the top wall 21 and the bottom wall 22, the top and bottom
 90 edges of these side walls are also equipped with similar felt strips, indicated in Fig. 1 by reference characters 56 and 57 respectively.

It is believed that my invention and its
 95 mode of operation will be apparent from the foregoing without further description and it should be obvious that I have provided an amplifier which, while simple in construction and easy to manipulate, is very
 100 effective and satisfactory in operation and does not project beyond the contour of the cabinet or mar the symmetry of the design.

While I have illustrated and described
 105 one practical and preferred embodiment of the invention it should be obvious that considerable modification of the structural details may be resorted to within the purview of the invention as defined in the following
 110 claims.

I claim:

1. In a talking machine, the combination with a sound tube, of an amplifier having a contractible and expansible receiving mouth located opposite and registering with the
 115 delivery mouth of said sound tube.

2. In a talking machine, the combination with a sound tube, of an amplifier located opposite the delivery mouth of said sound tube and having hinged walls permitting
 120 adjustment of the transverse dimensions of the receiving mouth of said amplifier.

3. In a talking machine, the combination with a sound tube, of an amplifier located opposite the delivery mouth of said sound
 125 tube, said amplifier having laterally swinging side walls hinged at the outer vertical edges whereby their inner vertical edges are adjustable transversely of the delivery
 130 mouth of said sound tube.

4. In a talking machine, the combination
with a sound tube, of an amplifier located
opposite the delivery mouth of said sound
tube, said amplifier having laterally swing-
5 ing side walls formed with inwardly and
downwardly inclined upper edges and
hinged at their outer vertical edges, and a
top wall hinged at its outer horizontal edge
and resting on the inclined edges of said
10 side walls, whereby the inner vertical and
horizontal edges of said side walls and top
wall respectively are capable of adjustment
transversely of the delivery mouth of said
sound tube.

5. In a talking machine, the combination 15
with a sound tube, of an amplifier located
opposite the delivery mouth of said sound
tube, said amplifier having laterally swing-
ing side walls formed with inwardly and
downwardly inclined upper edges and hinged 20
at their outer vertical edges, and a top wall
hinged at its outer horizontal edge and rest-
ing on the inclined edges of said side walls,
and manually operable means for swinging
said side walls inwardly and outwardly 25
whereby to contract or expand the area of
the receiving mouth of said amplifier.

ALBERT A. HUSEBY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents.
Washington, D. C."



UNIVERSAL TONE ARM,
#1,209,464-----L. Markels,
Patented-December 19th, 1916.
Filed-April 16th, 1915.

L. MARKELS.
UNIVERSAL TONE ARM.
APPLICATION FILED APR. 16, 1915.

1,209,464.

Patented Dec. 19, 1916.
2 SHEETS—SHEET 1.

Fig. 1,

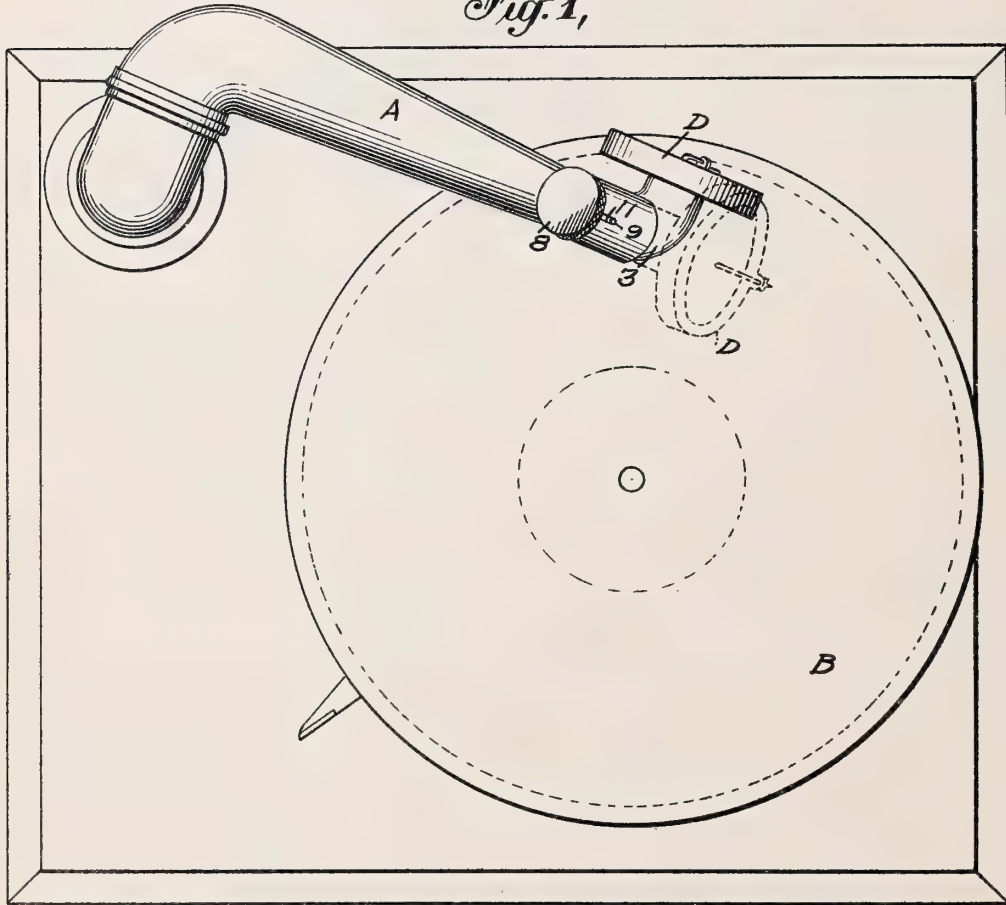
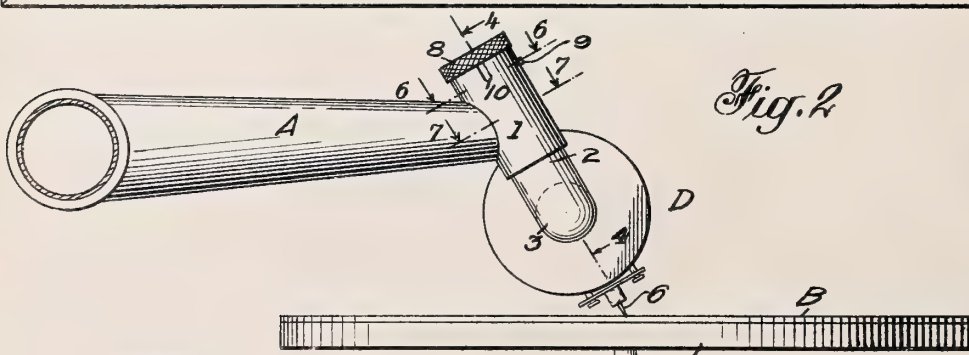


Fig. 2



WITNESSES:

L. Hauerstein
A. Bradway

INVENTOR

Leonard Markels.

BY

Mum & Co
ATTORNEY

L. MARKELS.
UNIVERSAL TONE ARM.
APPLICATION FILED APR. 16, 1915.

1,209,464.

Patented Dec. 19, 1916.
2 SHEETS—SHEET 2.

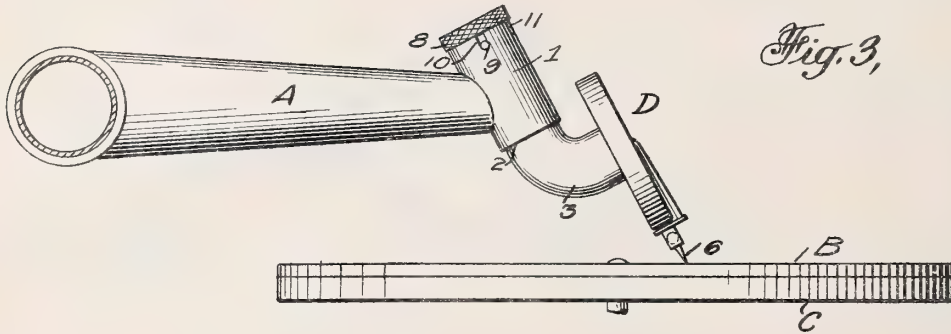


Fig. 3,

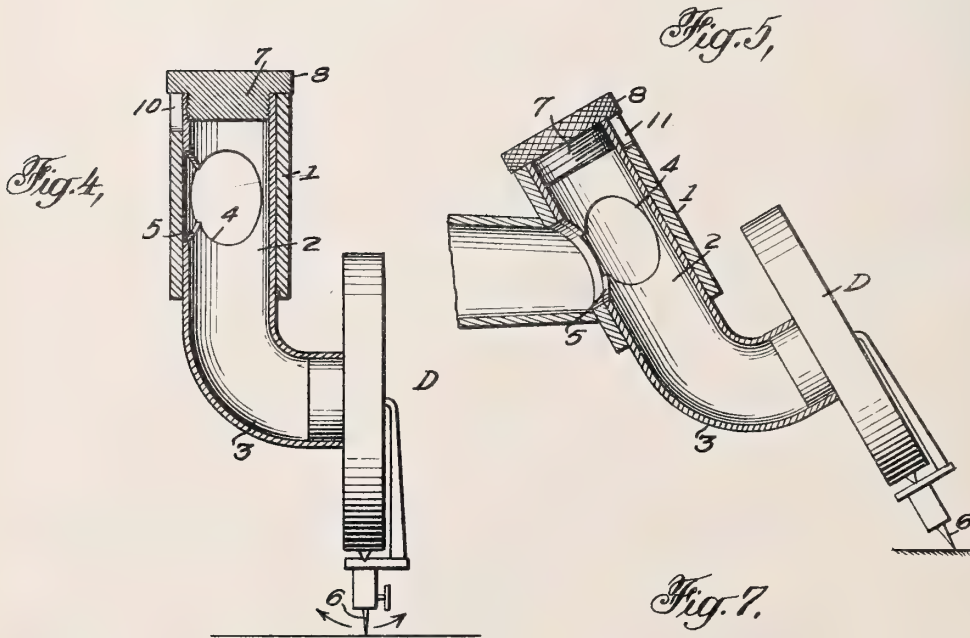


Fig. 4,

Fig. 5,



Fig. 6,

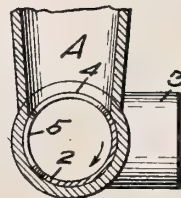


Fig. 7.

WITNESSES:

L. Hauerstein
Bradway

INVENTOR
Leonard Markels
BY *Wm. Co.*
ATTORNEY

UNITED STATES PATENT OFFICE.

LEONARD MARKELS, OF NEW YORK, N. Y., ASSIGNOR TO CHAMPION GRAPHAPHONE COMPANY, INC., OF NEW YORK, N. Y.

UNIVERSAL TONE-ARM.

1,209,464.

Specification of Letters Patent. Patented Dec. 19, 1916.

Application filed April 16, 1915. Serial No. 21,719.

To all whom it may concern:

Be it known that I, LEONARD MARKELS, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Universal Tone-Arm, of which the following is a full, clear, and exact description.

This invention relates to a tone arm for phonographs of the disk type and has to deal more particularly with an arm of that class which is provided with a reproducer holder whereby the reproducer can be set for operating on disk records having a laterally waved groove or a vertically waved groove.

The general objects of the invention are to improve and simplify the construction of tone arms of the character referred to so as to be reliable and efficient in use, comparatively simple and inexpensive to manufacture and so designed that the reproducer can be quickly and reliably adjusted to either of its two operative positions.

A more specific object of the invention is to provide novel and effective means for locking the reproducer-carrying member of the arm in position with the diaphragm held for operation on either type of record, and yet by simple movements of the outer member first longitudinally and then rotary the said member can be adjusted to its other position and effectively locked against turning.

With such objects in view, and others which will appear as the description proceeds, the invention comprises various novel features of construction and arrangement of parts which will be set forth with particularity in the following description and claim appended hereto.

In the accompanying drawings, which illustrate one embodiment of the invention and wherein similar characters of reference indicate corresponding parts in all the views, Figure 1 is a plan view of a phonograph with the invention applied thereto; Fig. 2 is a side view of the tone arm with the reproducer set for operation on a record having a laterally waved sound groove; Fig. 3 is a similar view showing the reproducer set for a record having a vertically waved sound groove; Fig. 4 is an enlarged sectional view on the line 4—4, Fig. 2; Fig. 5 is a vertical section when the reproducer is set in dotted-

line position (Fig. 1); and Figs. 6 and 7 are sectional views respectively on the lines 6—6 and 7—7, Fig. 2.

Referring to the drawing, A designates the tone arm of the phonograph, which is constructed and movably mounted in the usual manner so as to move over the record B carried on the usual turntable C. The outer end of the tone arm has a socket 1 disposed at an angle to a vertical plane similar to the angle that the needle requires, this socket 1 being open both at its top and bottom and communicating with the passage of the arm A, so that sound waves can pass therethrough. Rotatably mounted in the socket is the straight portion 2 of the elbow member 3 which carries an ordinary reproducer D. The straight portion 2 of the member 3 has two openings 4 and 5 disposed with their centers about ninety degrees apart, so that the member 3 will always communicate with the arm A when the member 3 is adjusted to throw the reproducer D from the full to the dotted line position, Fig. 1, or vice versa, or to the position shown in Figs. 2 and 3, whereby records of any well known make can be used with the needle 6 of the reproducer in its proper angular position with respect to the plane of the record disk. The reproducer-carrying member 3 has a screw plug 7 threaded in its upper end, and this screw has a knurled head 8 projecting circumferentially so as to engage the upper edge of the socket 1. This head projects beyond the circumferential surface of the socket 1 so that the head can be conveniently grasped between the thumb and forefinger to enable the reproducer-carrying member to be pulled upwardly or longitudinally in the socket member 1 for shifting the member 1 to its different positions. The reproducer is held in either of its desired positions by means of a locking pin 9 engageable in either of two slots 10 and 11 extending longitudinally and downwardly in the socket from the upper edge. This pin 9 can be removed by unscrewing from the straight portion 2 of the member 3, and then when the screw plug 7 is removed the member 3 can be taken out by being pulled downwardly out of the socket 1. To adjust the reproducer the member 3 is moved upwardly to disengage the pin 9 from one slot, and then the member is rotated through ninety degrees to

bring the pin 9 into alinement with the other slot, when the reproducer-carrying member is moved downwardly to engage the member 9 in such other slot.

5 Although the invention has been shown as of such design as to enable a single tone arm to hold a reproducer in position for operating on either of the types of record referred to, there are certain features of the
10 invention which are useful in tone arms where the reproducer is not adjustable. It will be noted that the straight portion 2 of the member 3 is exteriorly smooth and is freely slidable longitudinally of the socket
15 1. This is advantageous, as the reproducer will be free to rise and fall with the unevenness of the revolving turntable or record tablet thereon, this being especially true in that type of tone arm where the
20 joint between the latter and the sound box admits of only a horizontal swinging motion. Of course when the arm 3 is not supposed to be rotatably adjustable only one slot 10 or 11 is provided in the socket 1 to
25 receive the pin 9, which latter keys the reproducer-carrying member 3 in place against rotation, but allows the said arm to move up and down in the socket 1. To permit of the up and down movement of
30 the member 3 in the outer end of the arm A, the fit of the parts will be loose enough to prevent binding.

From the foregoing description taken in connection with the accompanying draw-

ings, the advantages of the construction and 35 method of operation will be readily understood by those skilled in the art to which the invention appertains, and while I have described the principle of operation, together with the device which I now consider to be 40 the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative and that such changes may be made when desired as fall within the scope of the appended claim. 45

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

A phonograph tone arm having a socket on its extremity and open at its top and bot- 50 tom and inclined at an angle to the axis of the arm, an elbow member having a straight portion slidable longitudinally and rotatably in the socket, a reproducer on the said elbow member, said socket having in 55 its upper end a pair of slots extending vertically, a pin on the elbow member engageable in either of the said slots, the said pin being removable to permit the removal of the member from the socket, and a screw 60 plug threaded in the upper end of the said member and having a head of larger diameter than the external diameter of the socket to form means whereby the member can be gripped for adjusting the same. 65

In testimony whereof I have signed my name to this specification.

LEONARD MARKELS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

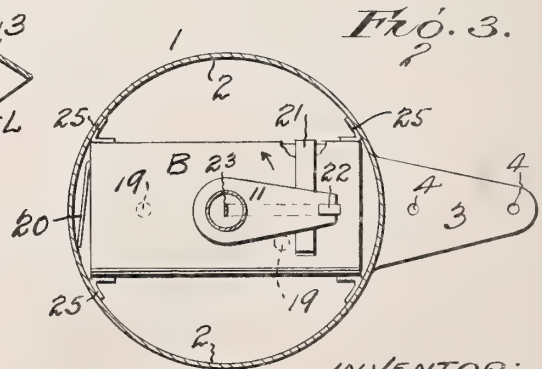
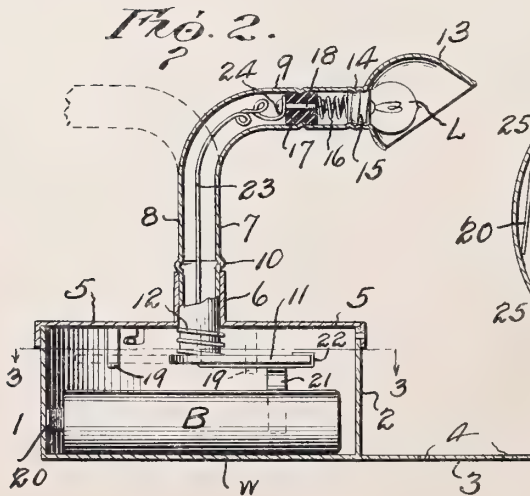
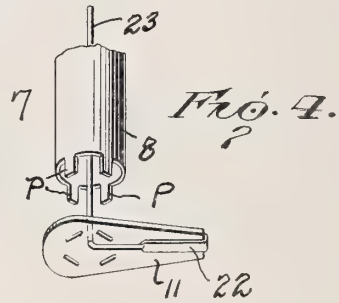
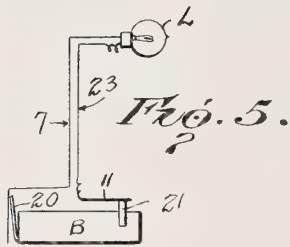
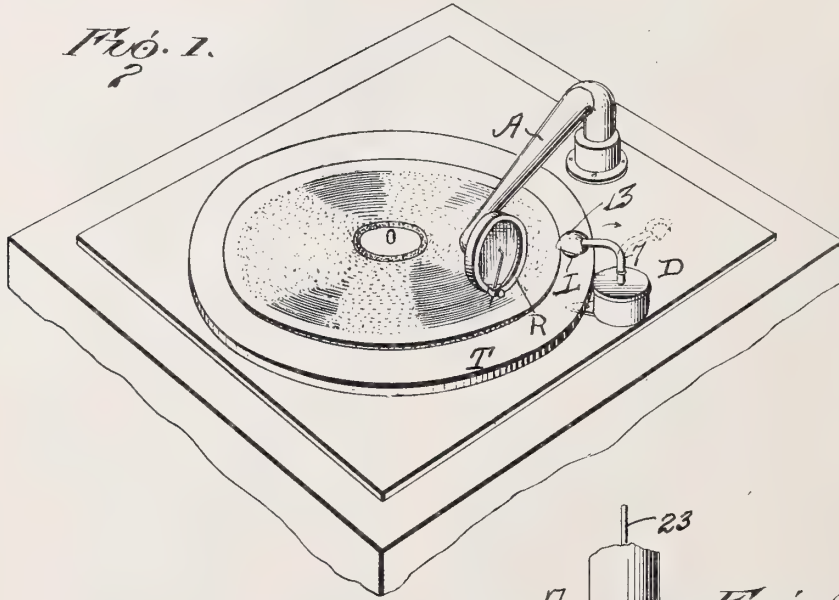
ILLUMINATING DEVICE FOR TALKING
MACHINE RECORDS,

#1,209,852-----C. A. Kotterman,
Patented-December 26th, 1916.
Filed-June 12th, 1916.

C. A. KOTTERMAN.
ILLUMINATING DEVICE FOR TALKING MACHINE RECORDS.
APPLICATION FILED JUNE 12, 1916.

1,209,852.

Patented Dec. 26, 1916.



INVENTOR:
CHESTER A. KOTTERMAN.
By *W. H. Williams*

UNITED STATES PATENT OFFICE.

CHESTER A. KOTTERMAN, OF WASHINGTON, DISTRICT OF COLUMBIA.

ILLUMINATING DEVICE FOR TALKING-MACHINE RECORDS.

1,209,852.

Specification of Letters Patent.

Patented Dec. 26, 1916.

Application filed June 12, 1916. Serial No. 103,188.

To all whom it may concern:

Be it known that I, CHESTER A. KOTTERMAN, a citizen of the United States, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Illuminating Devices for Talking-Machine Records, of which the following is a specification.

This invention relates to illuminating devices of the electric lamp type, and has particular reference to a novel and practical article of this character that is particularly designed for use as an auxiliary to assist in the manipulation of the disk-type of talking machines.

Accordingly, to this end, the invention has in view a simple and practical device, that is not only ornamental and attractive, but a useful accessory for talking machines, which provides a light adjacent the point of application of the needle to the record to thereby facilitate the placing of the former on the latter and also the placing of the needle or stylus in the holder on the reproducer. In this connection, the invention proposes to provide a device which, by the mere act of being turned into and out of position, to permit of the placing and removal of a record on the record table, is automatically lighted and extinguished.

Another object of the invention is to provide a device of this character which may be economically manufactured and is susceptible of a wide range of embodiment in different shapes and forms to harmonize with the different cabinet styles of modern talking machines, which may also be removably fixed to the cabinet. In this connection, the invention also contemplates a device which may be readily assembled and taken apart to effect replacements or repairs.

With the above and other objects in view which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

Although susceptible of various structural changes and forms of embodiment, a preferred and practical type of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is an enlarged perspective view of a phonograph cabinet showing the application of the present invention. Fig. 2 is a

vertical sectional view of the invention showing the switch parts in closed positions in full lines, and the relative position of parts when the circuit is broken in dotted lines. Fig. 3 is a horizontal sectional view on the line 3—3 of Fig. 2. Fig. 4 is a detail perspective view showing a preferable means of attaching the fiber switch arm to the switching post. Fig. 5 is a circuit diagram.

Similar reference characters designate corresponding parts throughout the several figures of the drawings.

In carrying out the present invention, it is proposed to provide a device D of a relatively diminutive character which may be readily positioned upon the top of a talking machine cabinet, as shown in Fig. 1 of the drawings; close to the rotary record table T, and adjacent to the reproducer R on the end of the sound arm A. In the construction shown, the device essentially comprises a base and an arched lamp bracket arm, which may extend over the edge of the record table, and although this is a convenient form of embodiment, it will, of course, be understood that the shape and character of both the base and arm portion of the device may be changed to suit various requirements and conditions of use without departing from the essential features of the invention.

Referring more particularly to the novel structural features of the invention, it will be observed from Fig. 2 that the device essentially comprises a hollow container body or receptacle 1 including a cylindrical side wall 2 and a flat bottom wall *w*, and may be mounted in any convenient way on top of the cabinet, and although various expedients may be adopted for this purpose, it is desirable to utilize some means which will not in any way mar or scratch the cabinet finish. Accordingly, to this end, there is shown in the drawings one means of attaching the device to the cabinet which consists in providing the same with an offset extension or ear 3 having therein suitable fastening receiving openings 4. This container body is preferably made of any suitable metal, and is closed at its upper end by means of a detachable metal cap 5. This cap may be locked to the upper edges of the cylindrical wall 2 of the body by a bayonet slot arrangement or other fastening means, and is preferably provided at its central portion with an upstanding sleeve 6 for receiving a rotatable metal switching post 7. This

rotatable post 7 is preferably hollow and of angular or elbow formation, thereby providing a vertical shank portion 8 and a horizontal arm portion 9. This shank portion 8 of the post may be formed, as shown, with an annular rib or shoulder 10 for abutting against the upper edge of the sleeve 6 carried by the cap, while the end portion thereof extends down through the sleeve and terminates at the inner side of the cap 5. This lower extremity of the shank 8 preferably carries a fiber switch arm 11 which is substantially attached to the internal end of the post preferably by clenching the attaching projections P of the latter into the end of the fiber switch arm. That is to say, the lower end of the shank 8, which forms the internal end of the rotatable post, may be provided with the fastening extensions P, as shown in Fig. 4, whereby the latter may be inserted in suitable openings formed in the fiber piece and then bent over or clenched to rigidly attach the fiber switch piece to the post.

For the purpose of providing the desired freedom of movement between the rotatable post on the relatively fixed cap 5 whereby the former may be swung through an arc of approximately 180° , there is provided a coiled friction spring 12 or equivalent means surrounding the lower end of the shank 8, and confined between the upper side of the switch arm 11 and the interior face of the cap 5, as clearly shown in Fig. 2. With this arrangement, it will be apparent that the post 7 may be rotated through the required arc with enough freedom to prevent unlimited swinging of the switch arm, which, of course, is not desirable.

The substantially horizontal arm portion 9 of the post is provided at its extremity with the suitable reflector shade 13, and is also formed with a threaded lamp socket portion 14 for receiving the plug 15 of an electric lamp L. In connection with this portion of the apparatus, it will be observed that the center contact of the lamp socket may be a coil spring 16 or the like which is secured to an insulated base member 17 by a metallic fastening 18 or other convenient means. The provision of the spring 16 as the center contact for the socket makes ample provision for the slight variation in the length of the screw plug portion of the lamp L, and tends to maintain an efficient contact between the battery and the lamp. Accordingly, it will be apparent that the novel and distinctive feature of the present invention is the provision of a container having a detachable cap carrying a rotatable switching post having at one end an electric lamp L and at its other end a switching arm 11, which may be limited in its movement by means of the stop lug 19 carried by the inner side of the cap 5. It may also be noted

in this connection that the range of movement of the rotatable post is sufficient for the arm 9 and reflector shade 13 to move clear of the record table T when the device is in position on the top of the cabinet to permit of the placing of the record on the table, and also removing the same therefrom, and when in position over the table, closes the circuit. The light from the lamp is sufficient to enable the operator to see to place the needle in the stylus holder if the machine is being played in the dark.

The container body 1 is adapted to receive a suitable electric battery B of any well known dry cell type having one pole thereof in contact with the cylindrical side wall 2 of the container of the battery circuit. To provide the other pole or terminal, the usual insulating covering of the battery may be opened at a convenient place to permit a suitable spring contact arm 21 to be secured to the negative electrode of one of the battery units, the said contact arm having a tendency to spring upward into the path of movement of the fiber switch arm 11. This arm carries the contact end 22 of a lamp wire 23, which is insulated throughout its length except for the portion on the lower face of the fiber switch arm, and connects as at 24 with the screw 18 which forms a part of the center contact of the lamp socket. Thus, it will be apparent that since the plug 15 of the lamp L is in metallic contact with the shell 14, and the center contact of the lamp is connected with the spring 16, the circuit is closed from the battery B through the contact of the portion 22 of the wire 23 with the contact member 21 of the battery. This is shown diagrammatically in Fig. 5. That is to say, the battery B is earthed as at 20 by touching the casing, and the plug 15 of the lamp L is also earthed by connection with the metallic shell 14 of the lamp socket, while the center plug contact is insulated from the arm and is connected with the battery contact 21 by means of the insulated wire 23 whose lower end is held in the insulated switch arm 11, but exposed for contact, for a portion of its length, with the arm 21 of the battery.

When the switching post 7 is in the position shown in full lines in Fig. 2, the circuit to the lamp is closed, since the portion 22 of the wire 23 is in contact with the contact member 21 of the battery. However, when the switching post is shifted to the dotted line position, the circuit is broken, since the switch arm 22 has been swung through an arc of sufficient magnitude to remove it from the contact 21. The battery B may be held in a fixed position in the container 2 by any suitable means, preferably by means of the angle brackets 25, shown in Fig. 3, which will prevent the metallic portion of the battery coming in contact with the side wall 2

of the container and thus forming a short circuit.

From the foregoing, it will be apparent that the present device may be placed adjacent the record table T of a phonograph, so that the attaching extension 3 may extend beneath the record table. In this connection, it may be noted that when the ear 3 is employed, in order to attach the device to the cabinet, the record table may be removed and the attaching plate secured to the top of the cabinet by any suitable fastening, so that when the table is replaced on the center spindle, the attaching means will not be seen. Also in case it is desired to later remove the device, the screw holes will not be noticed, as they will always be under the record table. However, it will be understood that other means may be employed to this end. It will also be clear that when the switching post is rotated toward the initial point of application of the reproducer of the record, the lamp L becomes lighted, but when turning the arm away from the table to permit of the removal of the record, the light is extinguished.

Without further description, it is thought that the many features and advantages of the present invention will be readily apparent, and it will, of course, be understood that various changes in the form, proportion and minor details of construction may be resorted to without departing from the spirit of the invention or scope of the appended claims.

I claim:

1. An illuminating device of the class described comprising a holder carrying a source of electrical energy and a switch contact, a top piece for the holder, and an extended lamp support, movably mounted on the top piece, and carrying a lamp socket offset therefrom, said lamp support also carrying a switch member, the movement of said lamp support on the said top piece actuating to bring the switch member into engagement with the switch contact and also to shift the lamp position.

2. An illuminating device of the class described comprising a holder carrying a source of electrical energy and a switch contact, a top piece for the holder, a lamp support movably mounted upon the top

piece and carrying a lamp socket offset therefrom, said support also carrying a switch member adapted to engage said switch contact, and a reflector also carried by the offset part of the support and adapted to cover the lamp position.

3. An illuminating device of the class described comprising a container body carrying a source of electrical energy and a switch contact, a cap for said body, and a lamp shifting post rotatably fitted to the cap and extending outwardly therefrom, said post carrying a lamp socket offset therefrom and also carrying a switch member, the rotation of the post operating to actuate the switch and also to shift the lamp position.

4. An illuminating device of the class described comprising a container body carrying a source of electrical energy and a switch contact, a cap for said body, a lamp shifting post rotatably fitted to the cap and extending outwardly therefrom and also carrying a switch member, said post carrying a lamp socket offset therefrom, and a downwardly reflecting reflector carried by the post over the lamp position.

5. An illuminating device of the class described comprising a container body, a cap therefor, an upstanding sleeve carried by said cap, a post rotatably held in said sleeve, a lamp carried by one end of said post, and a spring confined between said switching arm and the cap and surrounding the lower end of the post to frictionally hold the latter to the cap.

6. An illuminating device for talking machine records including a main supporting member, a relatively fixed switch contact included in a source of electrical energy, an upright movable switching post having an offset portion carrying a lamp socket disposed approximately at right angles to the vertical axis of the post and adapted to swing toward the record position of the talking machine, and a switch arm carried by the post adapted to engage with said relatively fixed contact.

In testimony whereof I hereunto affix my signature in the presence of a witness.

CHESTER A. KOTTERMAN.

Witness:

EMORY L. GROFF.

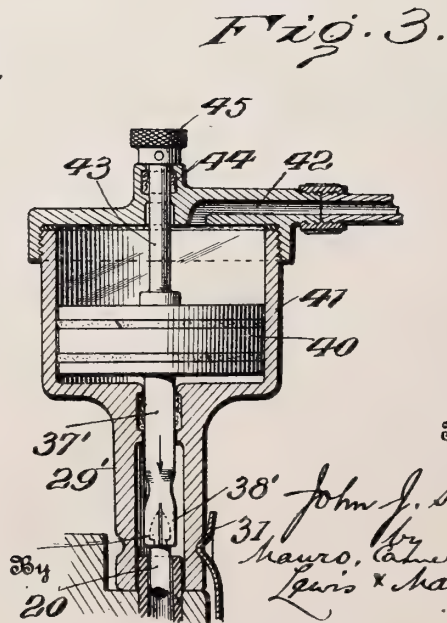
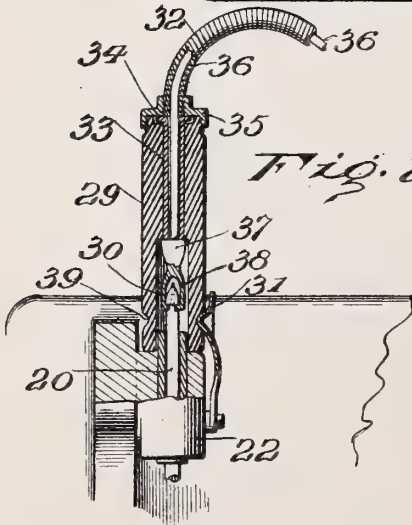
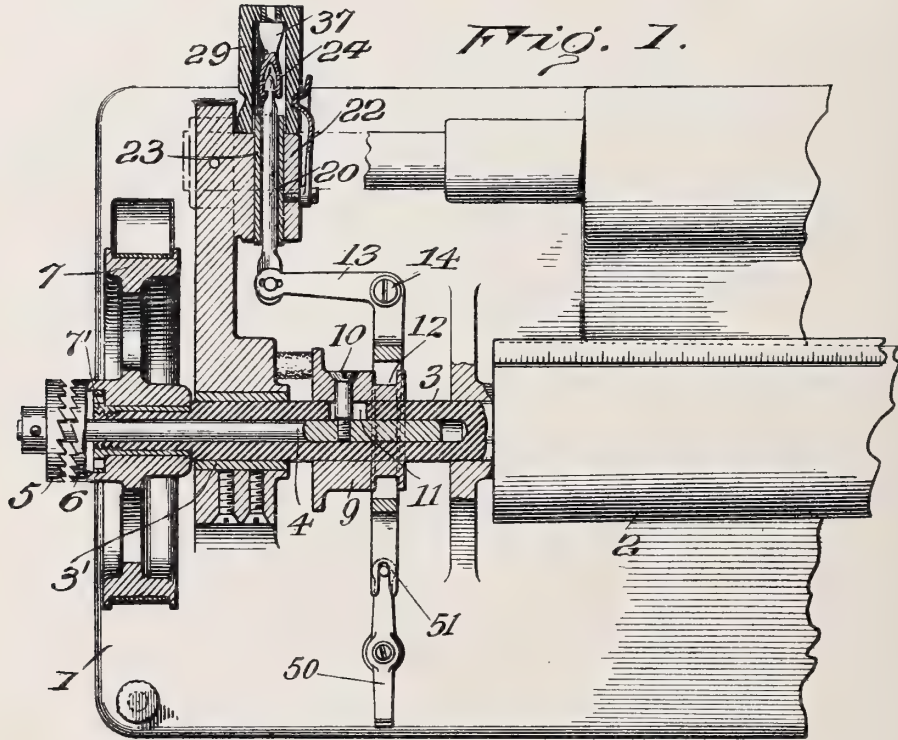
The first part of the paper is devoted to a general discussion of the problem of the existence of solutions of the system of equations (1) for arbitrary values of the parameters α and β . It is shown that the system (1) has solutions for arbitrary values of the parameters α and β if and only if the condition $\alpha + \beta = 1$ is satisfied. In the case when $\alpha + \beta \neq 1$, the system (1) has no solutions. The second part of the paper is devoted to a detailed study of the properties of the solutions of the system (1) for arbitrary values of the parameters α and β . It is shown that the solutions of the system (1) are unique and depend continuously on the parameters α and β . The third part of the paper is devoted to a study of the asymptotic properties of the solutions of the system (1) for large values of the parameters α and β . It is shown that the solutions of the system (1) approach zero as the parameters α and β approach infinity.

DICTAPHONE ATTACHMENT,
#1,209,891-----J. J. Scully,
Patented-December 26th, 1916.
Filed-November 15th, 1915.

J. J. SCULLY.
 DICTAPHONE ATTACHMENT.
 APPLICATION FILED NOV. 15, 1915.

1,209,891.

Patented Dec. 26, 1916.



Inventor

John J. Scully.

Hayes, Cameron,
 Lewis & Massie.

Attorneys.

UNITED STATES PATENT OFFICE.

JOHN J. SCULLY, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

DICTAPHONE ATTACHMENT.

1,209,891.

Specification of Letters Patent. Patented Dec. 26, 1916.

Application filed November 15, 1915. Serial No. 61,541.

To all whom it may concern:

Be it known that I, JOHN J. SCULLY, a citizen of the United States of America, and a resident of Bridgeport, Connecticut, have invented a new and useful Improvement in Dictaphone Attachments, which invention is fully set forth in the following specification.

This invention relates to talking-machines, and more particularly to the start-and-stop mechanism of machines of the character designed for dictation and transcribing. In such machines it is repeatedly necessary to stop the revolutions of the recording-tablet or blank and then start the same up again, and this is commonly done by providing a clutch-mechanism between the continuously-running motor and the mandrel, whereby the opening or closing of the clutch will stop or start the machine as the case may be. Heretofore it has been proposed to actuate such clutch by means of a pneumatic piston, and it has also been proposed to operate it by a purely mechanical device such as a Bowden wire or a mere finger-lever or the like.

Some users of these machines prefer the pneumatic control, while some prefer the Bowden wire or other non-pneumatic control; and one of the objects of the present invention is to provide a clutch-operating mechanism which may be actuated interchangeably by either the pneumatic or the Bowden-wire control (or by a mere finger-lever), so that the machine may be equipped interchangeably with whichever form of control the user may prefer, and both types of control may be supplied if desired.

Broadly stated, then, the invention comprises the employment with a talking-machine having the usual or any suitable motor and mandrel, of a clutch-mechanism for connecting or disconnecting the two, and any suitable pneumatic device and also any suitable purely mechanical device such as a Bowden wire, and in providing, in combination with the foregoing, suitable means for interchangeably connecting either of said actuating-devices with said clutch-mechanism.

The invention consists further of the improved form of clutch-mechanism; of the two improved forms of interchangeable actuating-devices; and of the novel means for

detachably connecting either of the latter with the former.

The invention consists further of the several features of construction and arrangement and combination hereinafter more particularly set forth and claimed.

The inventive idea is capable of being embodied in various forms, one of which is illustrated in the accompanying drawings; but said drawings are employed for the purpose of illustration only and are not intended to define the limits of the invention, which will be clearly set forth in the appended claims.

In the drawings which thus illustrate a preferred embodiment of the invention Figure 1 is a plan view of one end of the talking-machine, shown partly in horizontal section; Fig. 2 is a horizontal section, on an enlarged scale, of the means for detachably connecting the Bowden-wire actuating-device; and Fig. 3 is a similar view of a portion of the detachable pneumatic-device operatively connected in position.

In these drawings, 1 is a bed-plate of the machine, and 2 is the usual or any suitable mandrel mounted upon the mandrel-shaft 3 that turns in suitable bearings, one of which is indicated as the bushing 3'. This end of the mandrel-shaft is tubular, and receives the stub-shaft 4, which carries at its outer end the head 5 whose inner face is serrated to constitute one of the two clutch-members. The other clutch-member 6 consists of serrations upon the face of the hub of the usual or any suitable belt-pulley 7 concentrically journaled upon the outer end of the mandrel-shaft. Preferably a headed sleeve 7', having internal screw-threads, is fitted in the hub of pulley 7, as a bushing therefor, and the two (pulley and bushing) are passed over the reduced outer end of the mandrel-shaft and the sleeve 7' then screwed home (as by a spanner-wrench), as indicated in Fig. 1. Encircling the other portion of the mandrel-shaft is a sleeve or spool 9 that is secured fast to the stub-shaft 4, as by means of a transverse screw-pin 10 that extends through a longitudinal slot 11 in the mandrel-shaft, so that said spool and stub-shaft must move longitudinally together, but the two can thus move independently of the mandrel-shaft, while all three must rotate together. The longitudinal slot in the spool is of sufficient length to permit engagement

and disengagement of the two clutch-members 5 and 6, which is accomplished by longitudinal shifting of this spool. Upon the spool is a flange, and facing it a friction-stud is secured to the frame of the machine, so that, when the rotating spool is shifted (to the left) in opening the clutch, the friction-stud engages said flange and at once stops the revolutions of the spool (and the mandrel 2). Said spool 9 has likewise a groove 12 around its periphery, to be engaged by a suitable shifting-device. A preferred mechanism for this service comprises the bell-crank lever 13, pivoted to the bed-plate at 14, and having on one arm one or more projections engaging in said groove 12, while its other arm has a (slotted) connection with the plunger-rod 20 that reciprocates through a suitable bearing 22 on the frame. This rod 20 projects beyond said bearing and has a reduced neck and terminates in a head that tapers both at its rear or shoulder and at its front, for engaging and disengaging the detachable actuating-devices to be described later. If desired said rod 20 may be surrounded by a sleeve 23 of suitable friction-material such as leather or the like, to maintain rod 20 in whatever position it may be placed by the operator. The rear of said bearing 22 terminates in a socket for detachably receiving the plug 29 (Figs. 1 and 2) and the plug 29' (of Fig. 3) forming part of the interchangeable actuating-devices.

Referring to Figs. 1 and 2, which illustrate the employment of a Bowden-wire device 29 is the tubular-plug adapted to enter the socket aforesaid; and around its end is a sloping peripheral groove 39, adapted to be engaged by the retaining-spring 31 that is secured to the bearing 22. The sheathing 32 of the Bowden wire terminates in a rigid sleeve 33, which is placed within the bore of the plug and is provided with a flange or shoulder 34 held in place against the outer end of the plug, as by a screw-ring 35 (Fig. 2). The core 36 of the Bowden-wire passes through said sleeve 33 and terminates in a head 37 located within an enlarged portion of the bore of the plug, where it carries the split-spring fingers or catch-fingers 38 whose inturnd ends can be forced over the rounded head 24 of the plunger, either for engaging behind its shoulders or for being disengaged therefrom. It is obvious that the plug 29 carrying its core 36 and its catch-fingers 38 can be easily inserted in place in the socket, and by firmly pressing upon the plug the catch-fingers are caused to engage behind the shoulders of the plunger-rod 20; and that by pulling firmly and steadily upon the plug the parts can be disengaged and removed. It is also obvious that longitudinal movement of the Bowden core 36 imparts similar movement to the plunger

20; that the latter imparts a lateral movement to the further arm of the bell-crank 13; and that the latter shifts the spool 9 longitudinally of the mandrel-shaft, thereby engaging or disengaging the clutch 5—6.

Fig. 3 shows one form of pneumatic control, comprising a similar plug 29', similarly engageable in the socket and held in place by the spring 31. The outer end of this plug is enlarged at 41 to constitute the air-chamber or cylinder for the piston 40. At 42 is indicated the usual air-duct communicating with any suitable source of air-pressure within control of the operator. From the forward face of piston 40 extends a rigid stem 37' with split spring catch-fingers 38', adapted to engage and disengage the rounded head of the plunger-rod 20; and another rigid stem 43 projects from the rear face of the piston 40, through a suitable packing-gland 44 in the rear wall of the chamber 41, beyond which it terminates in a knurled head 45. By pressing upon this head 45 the catch-fingers can be forced into engagement with the plunger-rod 20. As Bowden-wire devices and pneumatic-controls are well understood, it is deemed unnecessary to illustrate the handle or actuating-means for manipulating the same to cause the member 37 or 37' to reciprocate longitudinally. If desired, there may be provided still another actuating-device, to wit, the finger-lever 50, pivoted upon the bed-plate, and having a cam adapted to engage the extended arm 51 of the bell-crank lever 13 and thereby shift the spool 9.

It will be apparent to those skilled in the art that various modifications of the specific construction here shown may be resorted to without departing from the principles of the invention; and therefore, while the construction has been specifically set forth for the purpose of clearly describing the invention, it is nevertheless to be understood that the invention is not limited to such specific construction, the limits of the invention being determined by the appended claims.

Having thus described the invention, what is claimed is:—

1. In a start-and-stop device for talking-machines, the combination of a driven pulley having a clutch member, a mandrel shaft having a second clutch member slidable into and out of engagement with the clutch member on the pulley, a lever operatively connected to said second clutch member, a plug socket, a rod connected to said lever and projecting from said plug-socket and provided at its outer end with means for engaging interchangeably with either a pneumatic actuator or a manually-operated actuator, whereby said rod can be actuated to shift said clutch.

2. In a start-and-stop device for talking-machines, the combination of a mandrel

shaft and a stub-shaft slidably mounted in the axis of said mandrel shaft and revolving therewith, a sleeve slidably mounted on the mandrel shaft and connected to said stub-shaft, a loosely-mounted driving-member, interlocking clutch members mounted respectively on said stub-shaft and driving member, and actuating-means connected operatively to said sleeve and provided at its outer end with means for engaging interchangeably with either a pneumatic actuator or a manually-operated actuator, whereby said rod can be actuated to shift said clutch.

3. In a start-and-stop device for talking-machines, the combination of a mandrel shaft, a driving element therefor, and clutch members on said shaft and element, with a shouldered rod operatively connected with one of said clutch members to shift the same, a head having spring clips engaging the shoulder on said rod, and manually operated means connected to said head for actuating said rod to throw the clutch.

4. In a start-and-stop device for talking-machines, the combination of a mandrel shaft and a driving element therefor, clutch members on said shaft and element, a lever for shifting one of said clutch members into operative relation with the other, a rod operatively connected to said lever and having a clip-receiving end, a spring clip engaging said clip-receiving end, and means actuating said clip to throw the shiftable clutch-member.

5. In a start-and-stop device for talking-machines, the combination of a mandrel shaft, a stub-shaft mounted to slide in the axis of said mandrel shaft and revolve therewith, a loosely-mounted driving member, corresponding clutch members on said driving member and stub-shaft, a plug-socket, a shiftable member projecting through said plug-socket and coöperatively connected to said stub-shaft, a plug, and manually operated means carried by said plug and engaging said shiftable member, whereby the clutch is operated.

6. In a start-and-stop device for talking-machines, the combination of a record-receiving mandrel, a mandrel shaft, a stub-shaft slidably mounted in and projecting from the end of said mandrel shaft, a loosely-mounted driving-pulley, a clutch member on said stub-shaft, a corresponding clutch-member on said pulley, a sleeve slidably mounted on said mandrel shaft and connected to said stub-shaft, a lever operatively connected to said sleeve for imparting sliding movement thereto, a plug-socket, a rod connected to said lever and projecting from said plug-socket, and detachable manually-actuated means connected to said rod for actuating the same to shift the clutch.

7. In a talking-machine, start-and-stop mechanism, a plunger rod located in a socket of said machine for operating said mechanism, a round-shouldered head on the end of said rod, and a detachable actuating-device having a socket-engaging device adapted to engage said socket and also having spring-fingers adapted to engage said shouldered head.

8. In a talking-machine, start-and-stop mechanism, a plunger-rod for operating said mechanism, a round-shouldered head on the end of said rod, an actuating-device detachably engaging said shouldered head, and means for retaining said actuating-means in operative engagement.

9. In a talking-machine, start-and-stop mechanism built into the machine and comprising the combination of operative-mechanism and a plunger-rod adapted to engage positively yet interchangeably either a detachable pneumatic actuating-device or a detachable mechanical actuating-device.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN J. SCULLY.

Witnesses:

LESLIE S. EASTMAN,
JOHN S. GRIFFITH.

The first part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a full understanding of the present. The author then proceeds to discuss the various factors that have shaped the development of the United States, including the role of the government, the influence of the economy, and the impact of the culture. The author concludes by stating that the study of the history of the United States is a task of great importance, and that it is one that should be undertaken by all who are interested in the future of the country.

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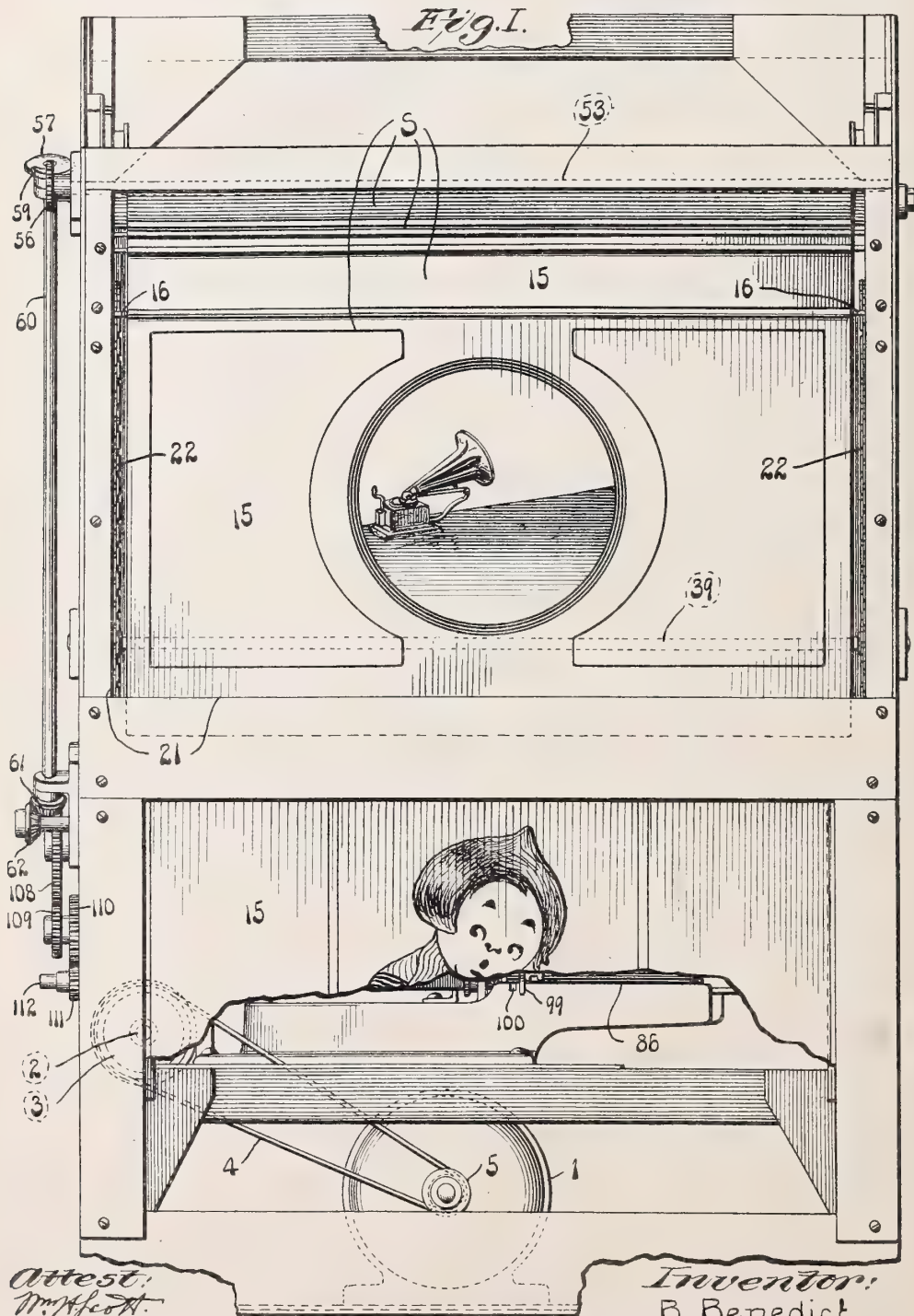
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TALKING MACHINE,
#1,210,138-----B. Benedict,
Patented-December 26th, 1916.
Filed-January 22nd, 1915.

1,210,138.

B. BENEDICT.
TALKING MACHINE.
APPLICATION FILED JAN. 22, 1915.

Patented Dec. 26, 1916.
5 SHEETS—SHEET 1.



Attest:
M. H. Scott.
A. J. McCauley.

Inventor:
B. Benedict
by Knight & Cook attys.

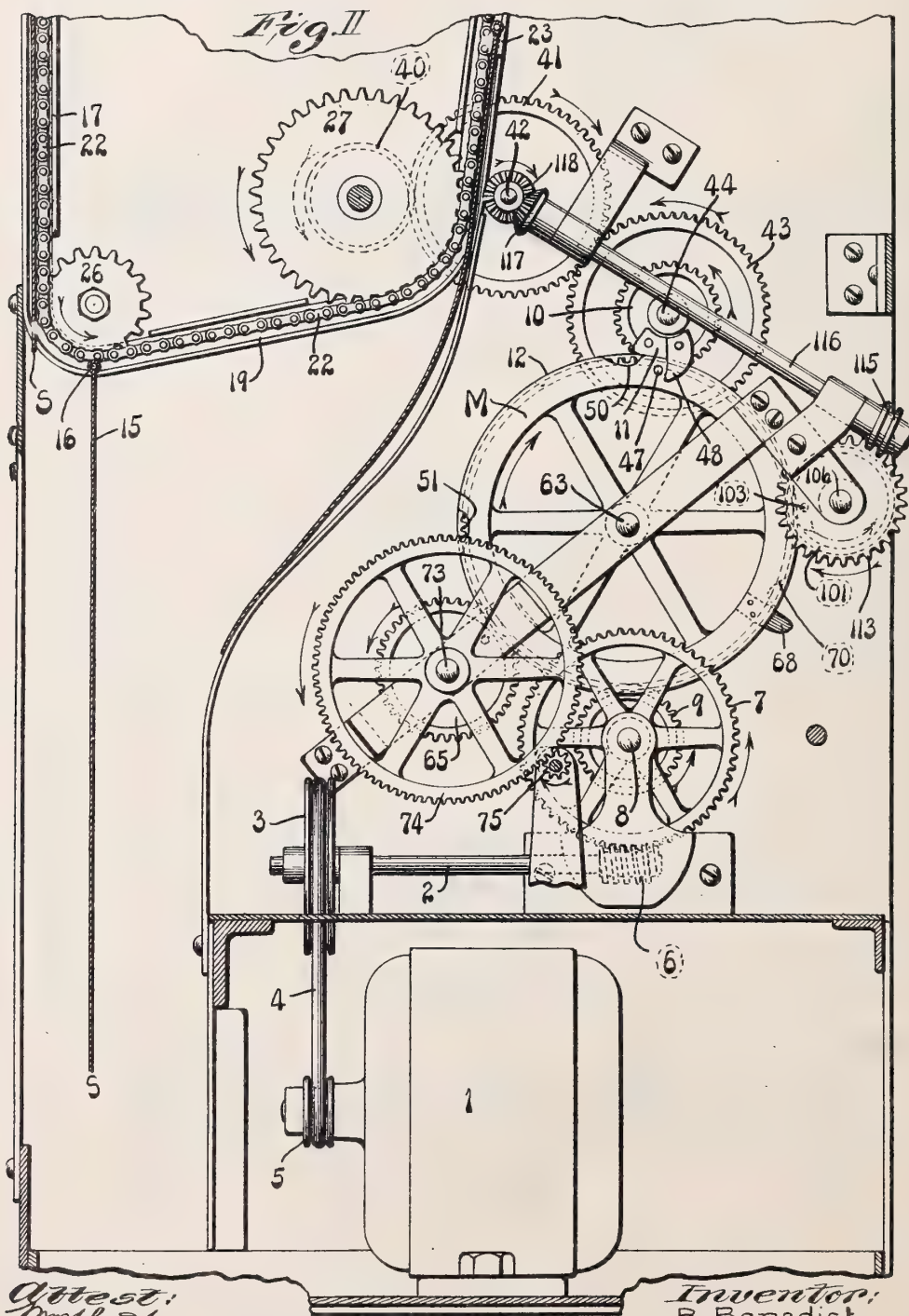
B. BENEDICT.
TALKING MACHINE.

APPLICATION FILED JAN. 22, 1915.

1,210,138.

Patented Dec. 26, 1916.

5 SHEETS—SHEET 2.



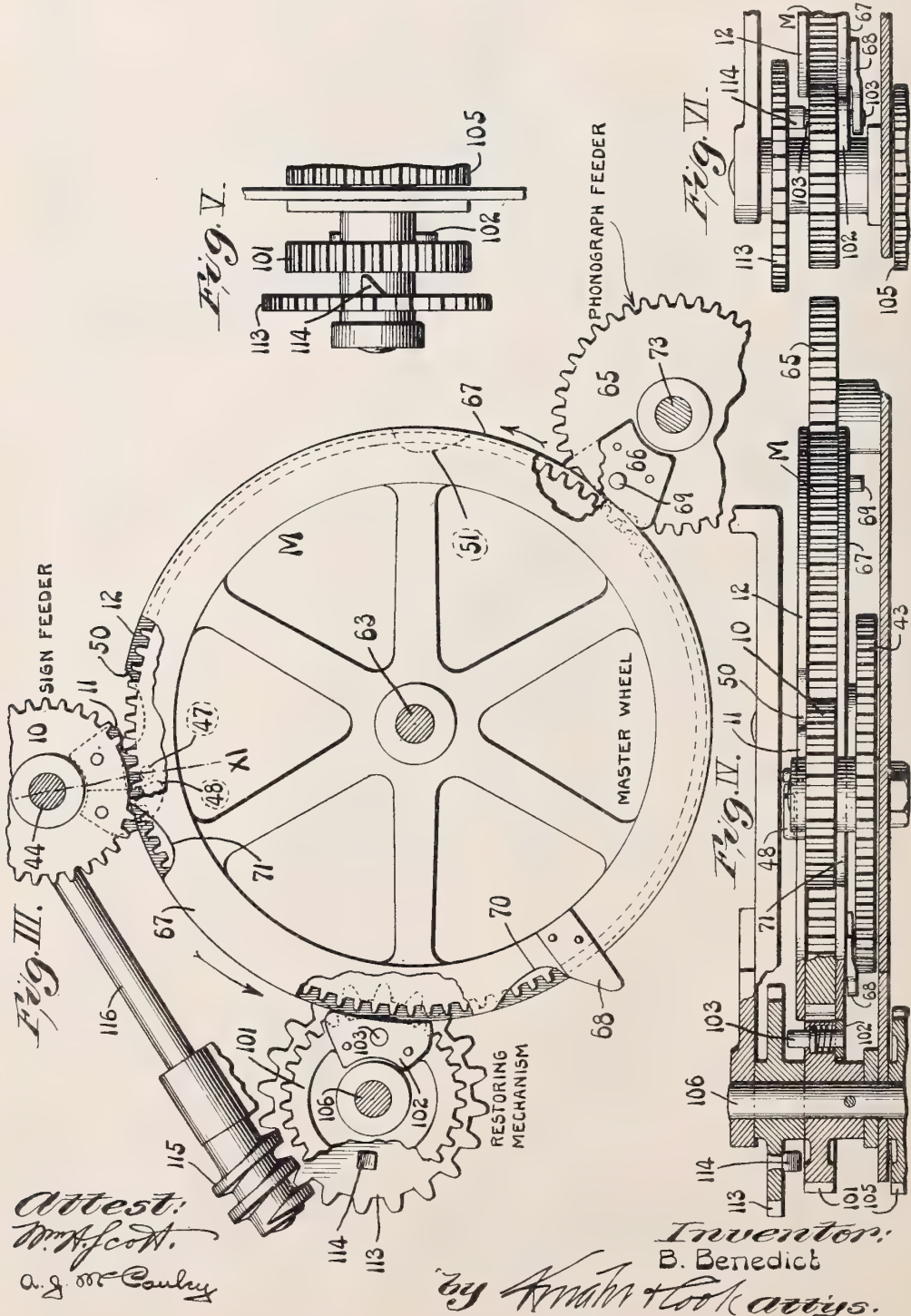
Attest:
M. J. Condit.
A. J. M. Bailey

Inventor:
B. Benedict
by *Knight & Hook* attys.

1,210,138.

B. BENEDICT.
TALKING MACHINE.
APPLICATION FILED JAN. 22, 1915.

Patented Dec. 26, 1916.
5 SHEETS—SHEET 3.



B. BENEDICT.

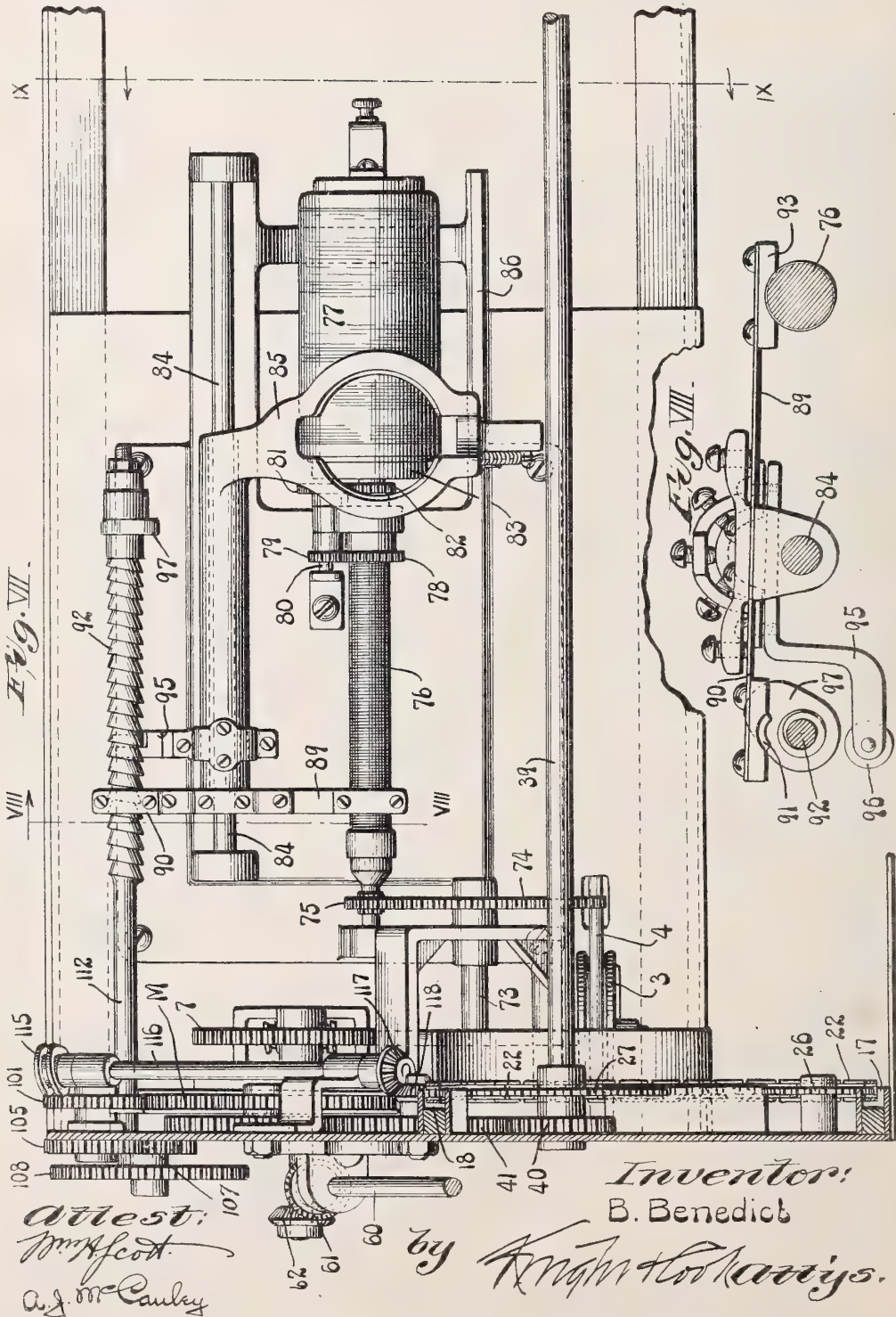
TALKING MACHINE.

APPLICATION FILED JAN. 22, 1915.

1,210,138.

Patented Dec. 26, 1916.

5 SHEETS—SHEET 4.



B. BENEDICT.
TALKING MACHINE.

APPLICATION FILED JAN. 22, 1915.

Patented Dec. 26, 1916.

5 SHEETS—SHEET 5.

1,210,138.

Fig. IX.

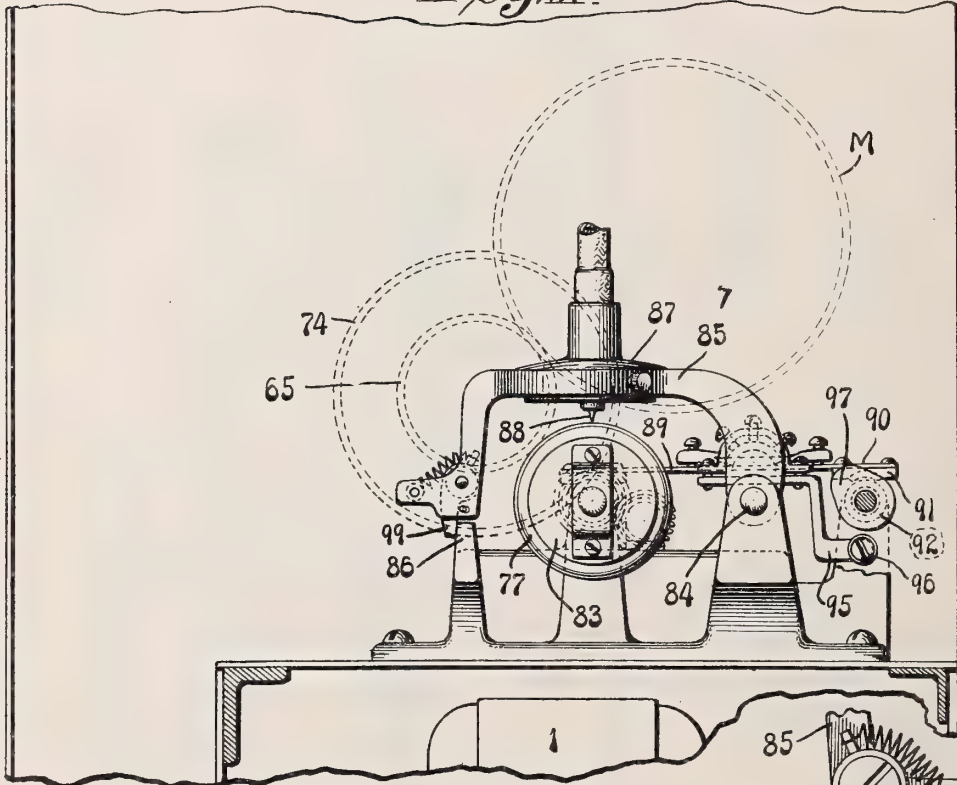


Fig. XI

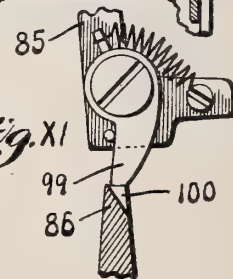
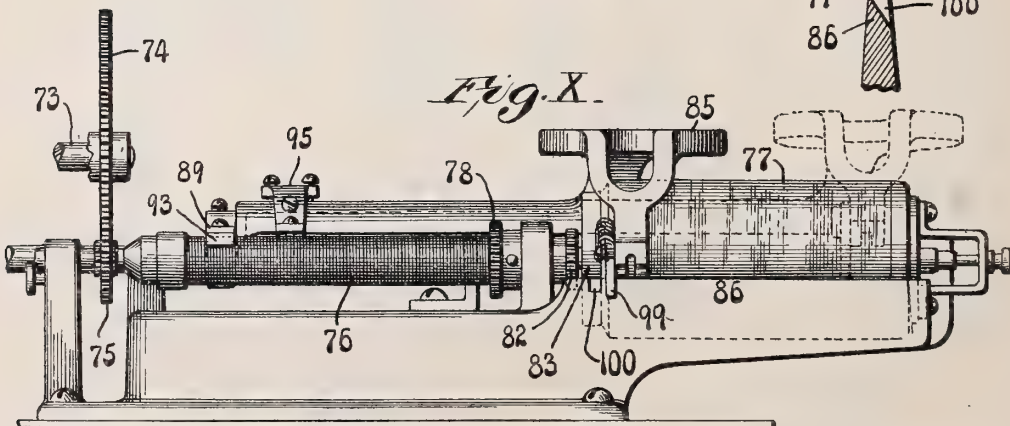


Fig. X.



Attest:
W. H. A. A.
A. J. 001 *Pauling*

Inventor:
B. Benedict
By Knuth & Co. Attys.

UNITED STATES PATENT OFFICE.

BERNARD BENEDICT, OF NEW YORK, N. Y., ASSIGNOR TO NATIONAL TALKING CLOCK COMPANY, OF JEFFERSON CITY, MISSOURI, A CORPORATION OF MISSOURI.

TALKING-MACHINE.

1,210,138.

Specification of Letters Patent. Patented Dec. 26, 1916.

Application filed January 22, 1915. Serial No. 3,775.

To all whom it may concern:

Be it known that I, BERNARD BENEDICT, a citizen of the United States of America, a resident of the city of New York, in the county of New York, State of New York, have invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to improvements in talking machines or phonographs, and it pertains more especially to mechanisms whereby the carriage of a machine of this kind is restored for repeated forward movement and continuous operation of the machine. A mechanism of this description is of particular value where a talking machine or phonograph is used in conjunction with display devices to attract or hold attention thereto.

The invention also includes certain new details of construction which will be herein-after pointed out.

Figure I is a front elevation, partly broken away, of an advertising device embodying the features of my invention. Fig. II is an enlarged vertical section of the lower portion of a device, looking toward the left side of the housing. Fig. III is an enlarged detail view illustrating the master wheel and the mutilated wheels which are driven intermittently in response to movements of the master wheel. Fig. IV is a top or plan view, partly in section, of the parts shown in Fig. III, also showing a fragment of the left hand wall of a casing and certain other wheels not shown in Fig. III. Fig. V is a rear elevation showing the drive wheel for restoring the phonograph reproducer, and the rotatable controller wheel for controlling the operation of said drive wheel. Fig. VI is a top or plan view of the parts shown in Fig. V, and also shown in cross section in Fig. IV, the cam projection on the controller wheel being positioned to shift the yieldable pin into the path of a trip finger on the master wheel. Fig. VII is an enlarged top or plan view partly in section illustrating the driving mechanism at the left wall of the housing and the phonograph near the lower end of the housing. Fig. VIII is a transverse section taken approximately on the line

VIII—VIII, Fig. VII. Fig. IX is a section taken approximately on the line IX—IX, Fig. VII. Fig. X is a front elevation of the phonograph, the reproducer being omitted. Fig. XI is an enlarged detail view of the pawl and track whereby the reproducer carriage is supported while the carriage is being returned to its starting position.

In the accompanying drawings, I have elected to show my improvement in talking machines as it would be used in connection with a sign displaying mechanism, but inasmuch as said displaying mechanism is not herein claimed, description of it is unnecessary and will be omitted.

1 designates a constantly running motor which is preferably an electric motor although it may be a mechanical motor in so far as my invention is concerned.

2 designates a transmission shaft provided with a pulley 3, and 4 is a belt passing around said pulley and fitted to the drive wheel 5 of the motor 1. A worm 6 fixed to the shaft 2 (Fig. II) meshes with a worm wheel 7, the latter being fixed to a shaft 8.

9 designates a pinion secured to the shaft 8, and meshing with the master wheel M. The master wheel is provided with a continuous circular row of teeth, and it is driven constantly through the medium of the mechanism just described.

Means for feeding the phonograph reproducer.—The phonograph includes a reproducer carriage which is driven intermittently through the medium of a mutilated drive wheel 65 associated with the master wheel M (Figs. II and III). The mutilated wheel 65 has a blank portion which faces the teeth of the master wheel M (Fig. III) when said wheel 65 is in its idle position, and it is driven intermittently to impart a step by step movement to the phonograph reproducer. Referring to Fig. IX, the mutilated wheel 65 is provided with a locking plate 66 having an arcuate face which engages a flange 67 on the master wheel so as to lock said mutilated wheel in its idle position. A finger 68 carried by the master wheel is adapted to engage a pin 69 projecting from the mutilated wheel 65. When the finger 68 strikes the pin 69 the mutilated wheel 65 is shifted from its inoperative position and a portion of its locking plate 66

enters a notch 70 in the flange 67. This movement engages the teeth of the mutilated wheel 65 with the gear teeth of the master wheel. When the mutilated wheel 65 has made almost one complete revolution a portion of its locking plate enters a notch 71 in the flange 67, and said mutilated wheel is then restored to its idle position.

The feeding mechanism driven by the mutilated gear wheel 65 comprises a shaft 73 fixed to said mutilated wheel, a gear wheel 74 fixed to said shaft, and a pinion 75 meshing with the gear wheel 74. The pinion 75 is fixed to a feed screw 76 (Figs. VII and X). The phonograph record 77 is rotated through the medium of a gear wheel 78 (Fig. VII) fixed to the feed screw 76 and meshing with a pinion 79 secured to a short shaft 80.

81 designates a pinion fixed to the shaft 80 and meshing with a pinion 82, the latter being secured to the rotatable record holder 83. The reproducer carriage, which is fed by the feed screw 76, is pivotally supported by a guide rod 84. This carriage is provided with an arm 85 which extends over the record 77, the free outer end of said arm being located above a track 86 which extends upwardly from the base of the phonograph mechanism. The reproducer 87 (Fig. IX) is provided with the usual needle 88 adapted to engage the phonograph record.

89 and 90 designate a pair of arms extending from and adjustably secured to the reproducer carriage (see Figs. VII and VIII). A nut element 91 secured to the arm 90 is adapted to engage a restoring screw 92, and a nut element 93 secured to the arm 89 is adapted to engage the feed screw 76 as shown most clearly in Fig. VIII. During the step by step feeding movements of the reproducer carriage, the nut element 93 is engaged with the feed screw 76 and the carriage is advanced in response to the rotary movements of said feed screw. During these movements the nut element 91 is disengaged from the restoring screw 92 as shown in Fig. VIII.

40 designates a pinion (see Fig. II) fixed to a shaft 39 and meshing with a gear wheel 41 secured to a shaft 42, the gear wheel 41 being in mesh with a gear wheel 43 secured to a shaft 44.

Means for imparting intermittent movement to the train of gearing just described is provided with and comprises a mutilated gear wheel 10 fixed to the gear wheel 43 and adapted to be driven intermittently by the master wheel M. The master wheel is provided with an endless circular row of gear teeth, but the mutilated gear wheel 10 is in the form of a segment having a blank portion which faces the teeth of the master wheel (Fig. III), when the mutilated gear wheel occupies its idle position.

The mutilated gear wheel 10 is provided with a locking plate 11 having an arcuate face which engages the periphery of a flange 12 on the master wheel, so as to lock said mutilated wheel in its idle position, Fig. II.

During each revolution of the constantly rotating master wheel, the mutilated gear wheel 10 is tripped and its teeth are engaged with the master wheel. When the mutilated wheel has made one complete revolution it again occupies its idle position, shown in Fig. II. The means for tripping the mutilated wheel 10 comprises a pin 47 carried by the master wheel and a finger 48 projecting from the mutilated wheel 10, Fig. II. When the pin 47 strikes the finger 48 the mutilated wheel 10 is turned slightly with the result of bringing its teeth into engagement with the teeth of the master wheel. At the beginning of this movement one corner of the locking plate 11, on the mutilated wheel, enters a notch 50 in the flange 12 of the master wheel. The mutilated wheel is then free to rotate in response to the movement of the master wheel, and when said mutilated wheel has almost completed one revolution, a notch 51 in the flange 12 of the master wheel is alined with the locking plate 11 on the mutilated wheel. A portion of the projecting plate 11 then enters the notch 51, and a continued movement of the master wheel will shift the mutilated wheel to its idle position.

Means for restoring the reproducer carriage.—After the reproducer has traveled a predetermined number of steps the reproducer is automatically restored to its starting position. In restoring the reproducer carriage it is rocked about the axis of the supporting rod 84 to disengage the needle from the phonograph record, to disengage the nut element 93 from the feed screw 76, and to engage the nut element 91 with the restoring screw 92. To accomplish this, the reproducer carriage is provided with an arm 95 (Figs. VII and VIII), said arm being provided with a roller 96 which lies below the restoring screw 92. When the reproducer carriage has been fed to a predetermined position, the roller 96 lies directly below a cam 97 secured to the restoring screw 92, and said restoring screw is then rotated with the result of lifting the nut element 93 from feed screw 76, also lifting the needle from the phonograph record, and engaging the nut element 91 with the restoring screw. The rotary movement of the restoring screw will then cause the carriage to return to its starting position. The means for supporting the reproducer carriage, during its return movement, includes a spring actuated pawl 99 pivoted to the reproducer carriage and adapted to rest upon the top face of

track 86, as shown in Fig. XI. When the reproducer is in operative engagement with the phonograph record the lower end of pawl 99 lies below the top face of track 86, as seen in Figs. IX and X, but when the pivoted reproducer carriage is rocked at the beginning of its return movement, the spring actuated pawl 99 is shifted to the position shown in Fig. XI. Obviously, this pawl 99 riding along the top face of track 86, serves as means for maintaining the nut element 93 out of engagement with the feed screw 76, and for retaining the nut element 91 in engagement with the restoring screw 92 during the return movement of the carriage. When the carriage reaches its starting position the spring actuated pawl 99 enters a notch 100 in the track 86 (Figs. X and XI) and the front portion of the pivoted carriage drops by gravity to engage the needle with the phonograph record, to engage the nut element 93 with the feed screw 76 (Fig. VIII), and to disengage the nut element 91 from the restoring screw 92.

I will now describe the means for operating the restoring screw 92 after the reproducer carriage has traveled a predetermined number of steps. 101 designates a mutilated gear wheel associated with the master wheel M, and provided with a locking plate 102 having an arcuate face which engages the periphery of the flange 67 on the master wheel, see Figs. III and IV. This mutilated wheel carries a spring pressed pin 103 adapted to be projected into the path of the finger 68 carried by the master wheel. When the pin 103 is projected, the mutilated wheel is tripped by the finger 68 and said wheel then makes one complete revolution, as will be readily understood. During many revolutions of the master wheel the spring pressed pin 103 occupies the position shown in Fig. X wherein it is located out of the path of the tripping finger 68. However, after the master wheel has made a predetermined number of revolutions, in other words, after the reproducer feeder has traveled a predetermined number of steps, the pin 103 is projected into the path of the tripping finger 68. Motion is then transmitted from the master wheel to the mutilated wheel 101 and through a train of gearing to the restoring screw. This train of gearing includes a transmission wheel 105, fixed to a shaft 106 the latter being rigidly secured to the mutilated wheel 101, as shown in Fig. IV. The transmission wheel 105 operable by the mutilated wheel meshes with a pinion 107 (Fig. VII) secured to a large gear wheel 108 which meshes with a pinion 109 (Fig. I) secured to a gear wheel 110, which meshes with a pinion 111, the latter being secured to a shaft 112 which forms part of the restoring screw 92.

pin 103 to project it into the path of the finger 68 (Figs. III, IV, V, and VI) comprises a gear wheel 113 loosely supported by the shaft 106 and provided with a cam lug 114 adapted to engage the spring pressed pin 103. When this cam lug 114 engages the spring pressed pin 103, as seen in Fig. VI, the pin is positioned to be engaged by the tripping finger 68 carried by the master wheel. The gear wheel 113, carrying the cam lug 114, moves very slowly, and it is driven through the medium of a worm 115 shown most clearly in Figs. II and III. 116 designates a shaft secured to the worm 115 also secured to a bevel gear wheel 117 meshing with a similar wheel 118, the latter being secured to the shaft 42.

It will now be apparent that the shaft 116 drives the worm 115, that the gear wheel 113 is driven very slowly by said worm, and that, when the cam lug 114, carried by the wheel 113, engages the spring pressed pin 103 the reproducer carriage is restored as previously set forth.

I claim:—

1. A device of the character described comprising a phonograph having a reproducer carriage, and power mechanism for feeding said carriage step by step and for restoring said carriage after it has traveled a predetermined number of steps, said power mechanism including an operating wheel, a drive wheel adapted to be driven by said operating wheel so as to restore the carriage and means for causing said drive wheel to partake of the movement of said operating wheel after the carriage has traveled said predetermined number of steps.

2. A device of the character described comprising a phonograph having a reproducer carriage, and a power mechanism for feeding said carriage step by step and for restoring said carriage after it has traveled a predetermined number of steps, said power mechanism including a gear wheel provided with a projection, a mutilated drive wheel adapted to mesh with said gear wheel so as to restore the carriage, means for locking said mutilated wheel while said carriage is moving step by step, a yieldable member carried by said mutilated wheel and means for shifting said yieldable member into the path of said projection to engage said mutilated wheel with the teeth of said gear wheel after the carriage has traveled a predetermined number of steps.

3. A talking machine having a reproducer carriage, power mechanism for feeding said carriage step by step to a predetermined position, said power mechanism including an operating wheel, and means for transmitting movement from said operating wheel to said carriage so as to advance the latter to said predetermined position, restoring mechanism for returning said carriage after it

The means for shifting the spring pressed

reaches said predetermined position, said restoring mechanism including a drive wheel associated with said operating wheel, said drive wheel being idle while the carriage is advancing to said predetermined position, and a controlling device for causing said drive wheel to partake of the movement of said operating wheel when the carriage reaches said predetermined position.

4. A talking machine having a reproducer carriage, power mechanism including a master wheel and means for operating said master wheel continuously, means for transmitting movement from said master wheel to said carriage so as to advance the latter step by step to a predetermined position, and restoring mechanism for returning said carriage after it reaches said predetermined position, said restoring mechanism including a drive wheel associated with said master wheel, said drive wheel being idle while the carriage is advancing to said predetermined position, and a controlling device for causing said drive wheel to partake of the movement of said master wheel after the carriage reaches said predetermined position.

5. A talking machine having a reproducer carriage, power mechanism including a master wheel and means for operating said master wheel continuously, means for transmitting movement from said master wheel to said carriage so as to advance the latter step by step to a predetermined position, and restoring mechanism for returning said carriage after it reaches said predetermined position, said restoring mechanism including a drive wheel associated with said master wheel, said drive wheel being idle while the carriage is advancing to said predetermined position, and a controlling device for causing said drive wheel to partake of the movement of said master wheel after the carriage reaches said predetermined position, said controlling device including a controller wheel movable in unison with said master wheel while the carriage is advancing to said predetermined position.

BERNARD BENEDICT.

In the presence of—

L. SORGENFREY,
CHAS. GLAS.

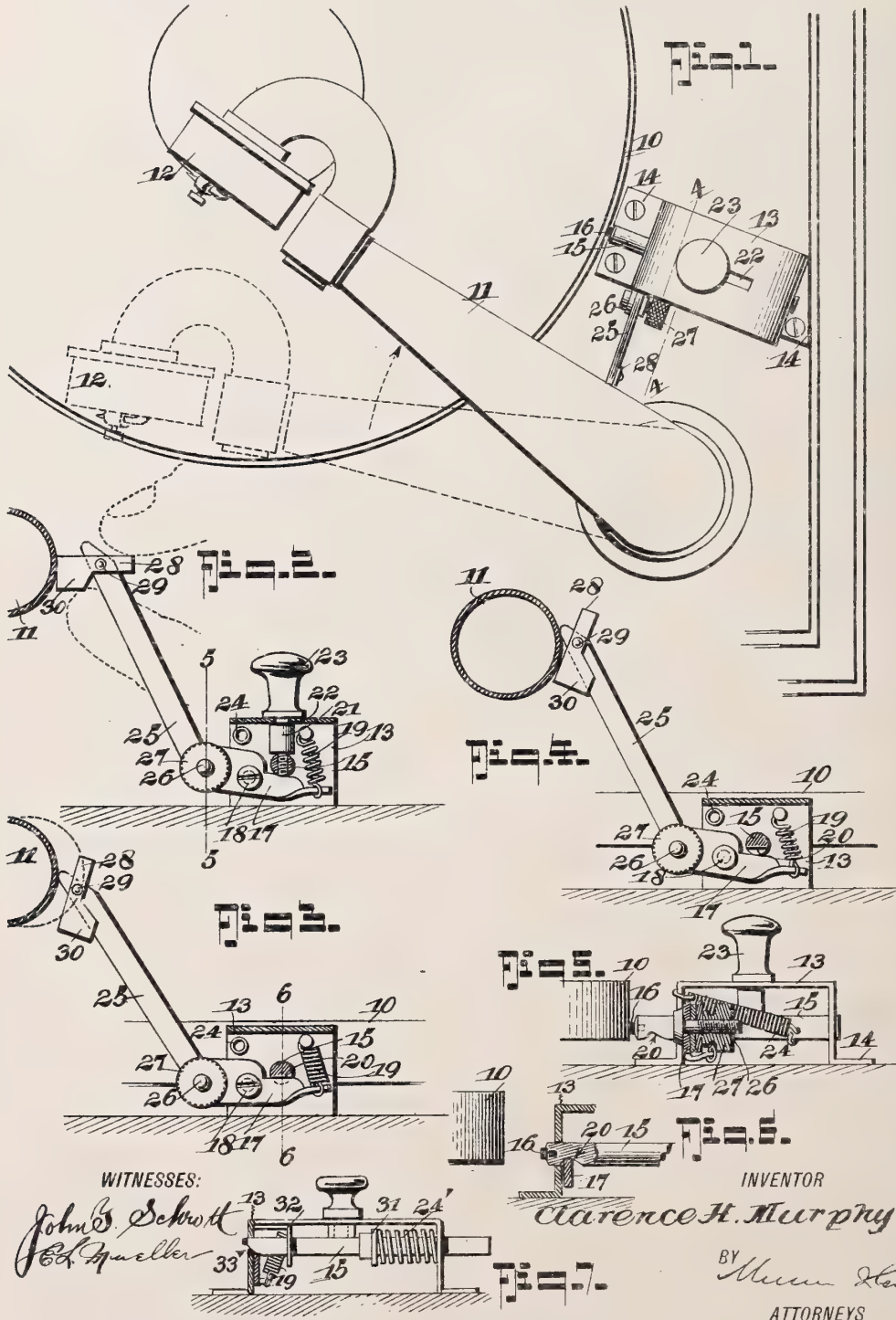
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

1210/5
AUTOMATIC STOP FOR TALKING MACHINES.
#1,210,195-----C. H. Murphy,
Patented-December 26th, 1916.
Filed-May 15th, 1916.

C. H. MURPHY.
 AUTOMATIC STOP FOR TALKING MACHINES.
 APPLICATION FILED MAY 15, 1916.

1,210,195.

Patented Dec. 26, 1916.



WITNESSES:

John B. Schrott
Ed. Mueller

INVENTOR

Clarence H. Murphy

BY *Mum & Co.*
 ATTORNEYS

UNITED STATES PATENT OFFICE.

CLARENCE H. MURPHY, OF POINT PLEASANT, NEW JERSEY.

AUTOMATIC STOP FOR TALKING-MACHINES.

1,210,195.

Specification of Letters Patent.

Patented Dec. 26, 1916.

Application filed May 15, 1916. Serial No. 97,611.

To all whom it may concern:

Be it known that I, CLARENCE H. MURPHY, a citizen of the United States, and a resident of Point Pleasant, in the county of Ocean and State of New Jersey, have invented an Improvement in Automatic Stops for Talking-Machines, of which the following is a specification.

This invention is an improvement in talking machines and has particular reference to a device for automatically stopping movement of the record at a predetermined point.

An object of the invention is the provision of a device adapted to be applied to any well-known type of talking machine wherein the movement of the sound box, in traversing the record groove, will automatically trip a mechanism to operate a brake member for bringing the turn-table to rest, said mechanism having associated therewith a novel device for adjusting the same to a position where the operation thereof will be effected at a predetermined point.

The inventive idea involved is capable of receiving a variety of mechanical expressions, some of which, for the purpose of illustrating the invention, are shown in the accompanying drawing, in which—

Figure 1 is a top plan view of a portion of a talking machine of the swinging tone arm type showing the automatic stop applied thereto and constructed in accordance with the invention. Fig. 2 is a transverse section of the stop showing the manner of initially adjusting the device. Fig. 3 is a view similar to Fig. 2 showing the parts in the position just previous to being contacted by the tone arm and the brake operated. Fig. 4 is a section on the line 4—4 of Fig. 1, the parts being in the position assumed after the brake is released. Fig. 5 is a section on the line 5—5 of Fig. 2. Fig. 6 is a section on the line 6—6 of Fig. 3. Fig. 7 is a side elevation partly in section of a slightly different form of the invention.

There is shown in the drawing what are now believed to be preferred forms of the invention and by reference to Figs. 1 to 6 inclusive, it will be seen that the same is shown in connection with a talking machine of the disk type having the usual turn-table 10, tone arm 11 and sound box 12.

The stop, which comprises the essential features of the invention, consists of a support 13 of substantially inverted U-shaped formation having flanges 14 at its ends which

are secured to the talking machine at a point adjacent the turn-table 10 and the tone arm 11. The support 13 has mounted longitudinally thereof and extending through its ends a brake member 15, preferably in the form of a rod, having a buffer 16 at one end, adapted to contact with the turn-table 10 whereby the impact of the parts will be cushioned. The support 13 is so arranged that the brake member 15 will extend radially with relation to the center of the turn-table.

The end of the support 13 adjacent the turn-table 10 has associated therewith a trip mechanism for controlling the operation of the brake member 15, said mechanism preferably including a latching element 17, pivoted at 18 to said end of the support and extending transversely thereof, one end of said latching element having connected thereto a small coil spring 19 the other end of which is secured to said support in such way as to at all times retain the latching element in engagement with the bottom of the brake member 15. This spring 19 also causes said latching element to engage a locking portion in the form of a notch 20 in the bottom of said brake member adjacent the turn-table engaging end thereof when said brake member is withdrawn from contact with said turn-table and previous to being released by said trip mechanism. The brake member 15 is withdrawn from braking position through the medium of a vertically arranged rod 21 having its lower end secured to the brake member 15 in any preferred manner and its upper end extending through a slot 22 formed longitudinally of the top of the support 13, a knob or handle 23 being secured to said upper end to facilitate the manipulation of the brake member. In order to cause the brake member to engage the turn-table, when said member is released by the trip mechanism, as will presently appear, there is provided a tension element in the form of a coil spring 24 having one end connected to one end of the support 13 while the other end is connected to said brake member.

The trip mechanism preferably includes, in addition to the latching element 17, a tone arm contacting lever 25 the lower end of which is pivotally mounted upon a small bolt 26 carried by the outer end of said latching element and having mounted thereon a milled nut 27 employed for the purpose

of releasably securing said lever in an adjusted position so that when operated by contact with the tone arm 11, as will presently be described, the latching member 17 will be thrown to the position shown in Fig. 4 against the tension of the spring 19 whereupon the spring 24 will operate upon the brake member 15 and cause the same to engage the turn-table 10.

10 In positioning the lever 25 for proper contact by the tone arm 11 at a predetermined point the invention contemplates an initial manual adjustment and a secondary automatic adjustment. For securing the
15 initial adjustment there is provided an adjusting device 28 pivoted at 29 adjacent the upper end of the lever 25 and preferably having an enlarged end 30 which overbalances the device and normally maintains it
20 in the position shown in Fig. 3. The first step in this adjustment is to swing the tone arm 11 over the record surface until the stylus of the sound box 12 is directly over one of the innermost grooves. The adjusting device 28 is then grasped as indicated
25 in Fig. 2 and moved to a substantially horizontal position and then the lever 25 is swung about its pivot 26 until the enlarged end 30 of the adjusting device contacts the tone arm 11 whereupon the nut 27 may be
30 tightened if there is not already sufficient friction at the pivot point to maintain the lever in its adjusted position. The release of the adjusting device 28 permits the same
35 to assume the position shown in Fig. 3 at which time, and before the secondary adjustment, the upper end of the lever 25 will be spaced a distance from the tone arm 11 equal to the distance between the enlarged
40 end of the adjusting device and said upper end of the lever. The knob 23 is then pulled along the slot 22 which movement retracts the brake member 15 from engagement with the turn-table 10 until the latching element
45 17 is caused, by the spring 19, to engage the notch 20 in the said brake member. The slight movement of the latching element 17 about its pivot 18 results in the secondary automatic adjustment of the lever 25 as it
50 will be seen that when the said latching element swings about its pivot the upper end of the lever 25 will describe a circle, with the pivot 18 as a center, until said end assumes the position that the enlarged end 30
55 of the adjusting device 28 maintains when the same is adjusted, as shown in Fig. 2, whereupon said upper end of the lever 25 will also contact the tone arm 11. The stylus of the sound box is then engaged with the outermost groove of the record which is reproduced and at the end of said reproduction the tone arm 11 will contact the upper
60 end of the lever 25 and operate the trip mechanism, against the tension of the
65 spring 19, thereby releasing the brake mem-

ber and permitting the same to engage the turn-table which is then brought to a stop.

In Fig. 7 a slightly modified form of the invention is shown wherein the spring 24 of the first embodiment described is replaced by a spring 24' coiled about the
70 brake member 15, one end of said spring engaging a flange 31 on said brake member while the other end thereof engages the adjacent end of the support 13. The brake
75 member extends through the ends of the support, as previously described, and in addition there is provided a brake 32 for receiving the braking end of said member 15, the latter end being reduced to provide a
80 locking portion 33.

What is claimed is:

1. In an automatic stop device for talking machines, the combination with a turn-table and a tone arm; of a brake member
85 slidable radially relative to the axis of rotation of said turn-table for engaging the same to stop rotation thereof, an adjustable trip mechanism arranged in the path of movement of said tone arm and engaging
90 said brake member to retain the same out of braking position, and an adjusting device carried by said trip mechanism and adapted to be moved temporarily into engagement with the tone arm to adjust said mechanism
95 with respect to the tone arm and then disengaged from the tone arm to permit said mechanism to be operated, by contact with the tone arm, to release said brake member at a predetermined point in the reproduction
100 of a record.

2. In an automatic stop device for talking machines, the combination with a turn-table and a tone arm; of a brake member for engaging said turn-table to stop rotation
105 thereof, an adjustable trip mechanism arranged in the path of movement of said tone arm and engaging said brake member to retain the same out of braking position, and an adjusting device pivoted to said trip
110 mechanism and normally maintained, by gravity, out of adjusting position, said adjusting device being adapted to contact the tone arm to adjust said trip mechanism to a position to be operated, by contact with the
115 tone arm, to release said brake member at a predetermined point in the reproduction of a record.

3. In an automatic stop for talking machines, the combination of a brake member
120 for normally engaging the turn table having a locking portion, a trip mechanism adapted to engage said locking portion to retain the brake member out of braking position and having a portion extending into the path of
125 the tone arm, an adjusting device carried by the portion of the trip mechanism, extending into the path of the tone arm and adapted to be temporarily moved into engagement with the tone arm to adjust the said portion
130

with respect to the tone arm and then disengaged from the tone arm to permit said portion to be operated by contact with the tone arm, and means for withdrawing said
5 brake member from braking position, whereby said trip mechanism will be moved into engagement with the locking portion of the brake members and the portion thereof carrying the adjusting device moved into
10 engagement with the tone arm.

4. In an automatic stop for talking machines, the combination of a support, a turntable, a brake member carried by said support, a latching element pivoted to said support for retaining said brake member out of
15 braking position and having its axis of rotation transverse to that of said turn-table, a trip member connected to said latching element, for operating the same and adjustable into the path of a movable part of the machine, an adjusting device carried by said trip member and contacted by said movable
20 part when initially adjusting said trip member, and means for shifting said brake member out of braking position whereby to permit said latching element to move about its pivot and said trip member to assume the position of initial adjustment of said adjusting device.

5. In an automatic stop for talking machines, the combination of a support, a turntable, a brake member carried by said support, a latching element pivoted to said support for retaining said brake member out of
35 braking position, a trip member connected to said latching element, for operating the same and adjustable into the path of a movable part of the machine, an adjusting device carried by said trip member and contacted by said movable part when initially adjusting said trip member, means for shifting said brake member out of braking position whereby to permit said latching
40 element to move about its pivot and said trip member to assume the position of initial adjustment of said adjusting device, and tension means connecting said support with said brake member for throwing the same to braking position when released by said
45 latching element.

6. In an automatic stop for talking machines, the combination of a brake member, a latching element engaging a portion thereof for retaining the same out of braking
55 position, a trip member having initial and secondary adjustments in the path of movement of a movable part of the machine, an adjusting device adapted for contact with said movable part for permitting said initial adjustment, and means for shifting
60 said brake member into latched position and thereby effecting said secondary adjustment wherein the trip member assumes the position maintained by said adjusting device during said initial adjustment.

7. In an automatic stop for talking machines, the combination of a brake member, a latching element engaging a portion thereof for retaining the same out of braking position, a trip member having manual and
70 automatic adjustments in the path of movement of a movable part of the machine, an adjusting device adapted for contact with said movable part for permitting said manual adjustment, and means for shifting said
75 brake member into latched position thereby effecting said automatic adjustment wherein the trip member automatically assumes the position maintained by said adjusting device during said initial adjustment.

8. In an automatic stop for talking machines, the combination of a brake member, a latching element engaging a portion thereof for retaining the same out of braking position, a trip member having initial and
80 secondary adjustments in the path of movement of a movable part of the machine, an adjusting device pivoted to one end of said trip member and having a weighted end adapted for contact with said movable part for permitting said initial adjustment and
85 movable out of contact therewith when released, and means for shifting said brake member into latched position thereby effecting said secondary adjustment wherein the
90 brake member assumes the position maintained by said adjusting device during said initial adjustment.

9. In an automatic stop for talking machines, the combination of a brake member, a latching element engaging a portion thereof for retaining the same out of braking position, a trip member having initial and
100 secondary adjustments in the path of movement of a movable part of the machine, an adjusting device pivoted to said trip member and having contact with said movable part for effecting said initial adjustment and movable out of contact therewith when
105 released, and means for shifting said brake member into latched position, thereby permitting said secondary adjustment wherein the brake member assumes the position maintained by said adjusting device during
110 said initial adjustment.

10. In an automatic stop for talking machines, the combination of a substantially inverted U-shaped support, a brake member slidable longitudinally of said support and arranged in substantial alinement with the
120 axis of the turn-table of the machine, a latching element carried by said support for retaining said brake member out of braking position, a trip member connected to said latching element for operating the same and adjustable into the path of a movable part of the machine, an adjusting device carried by said trip member and contacted by said movable parts when initially adjusting said trip member, and means for shifting said
125 130

brake member out of braking position whereby to permit said latching element to move about its pivot and the trip member to assume the position of initial adjustment of said adjusting device.

11. In an automatic stop for talking machines, the combination of a brake member, a latching element associated therewith for retaining the same out of braking position, a trip member carried by said latching element and adjustable into the path of movement of a movable part of the machine, said trip member having primary and secondary adjustments, an adjusting device pivoted to said trip member and adjustable in the path of movement of said movable part for effecting said primary adjustment, and means for withdrawing said braking element from braking position whereby said trip member will assume the position of said adjusting device when making the primary adjustment and thereby effecting said secondary adjustment.

12. In an automatic stop for talking machines, the combination of a brake member, means for locking and releasing the brake member and including a member extending

into the path of the tone arm and adapted to be engaged thereby to release the brake member, and an adjusting device carried by the member of the braking and releasing means and adapted to be moved temporarily into engagement with the tone arm to adjust the said member with respect thereto and then disengaged from the tone arm to permit said member to contact with the tone arm and to be operated thereby.

13. In an automatic stop for talking machines, the combination of a brake member, means for locking and releasing the brake member and including an arm extending in the path of the tone arm and adapted to be engaged thereby to release the brake member, and a pivoted and weighted member mounted in the free end of the said arm, said member being adapted to be engaged with the tone arm to permit the arm to be properly adjusted with respect to the tone arm.

CLARENCE H. MURPHY.

Witnesses:

THOS. C. CURTIS,
GEORGIA T. GRAHAM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

GRAPHOPHONE,
#1,210,248-----Clinton E. Woods,
Patented-December 26th, 1916.
Filed-March 8th, 1915.

1,210,248.

Patented Dec. 26, 1916.

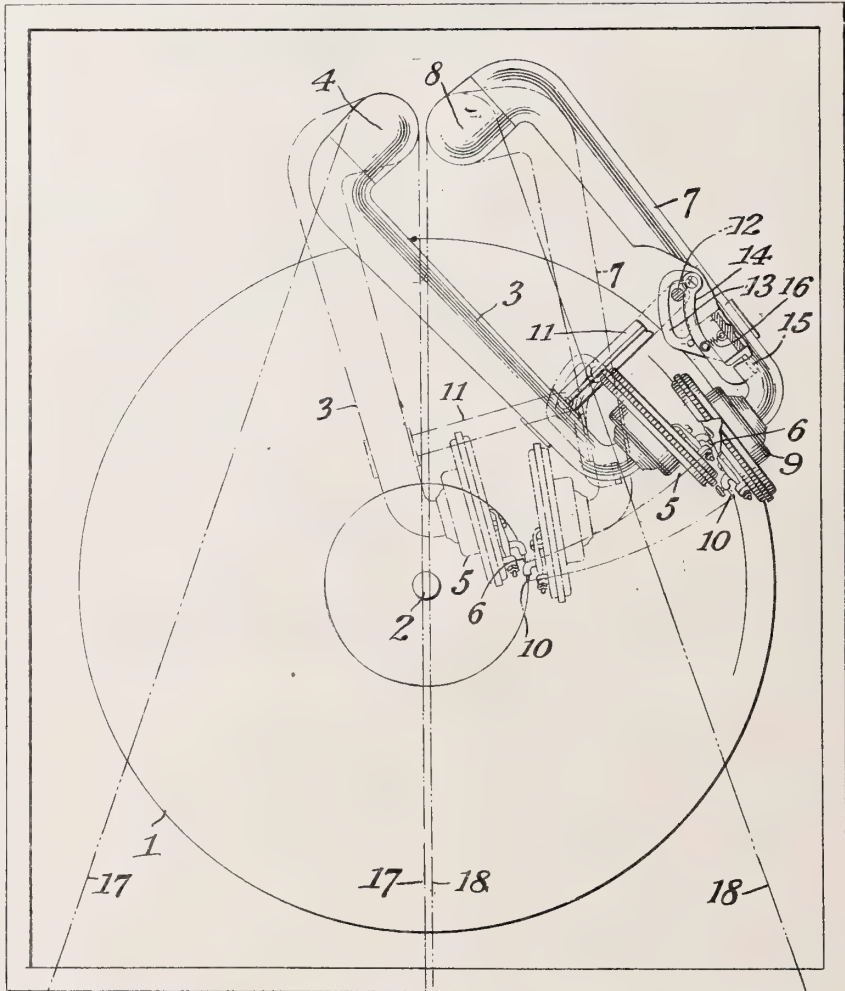


Fig. 1.

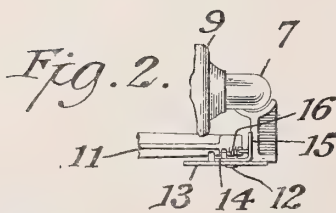


Fig. 2.

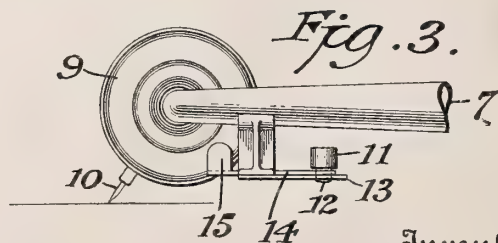


Fig. 3.

Witnesses:

M. C. Lucas
 Sidney L. Thubbe

Inventor

Clinton E. Woods

By his Attorney
 Mauro Cameron & Morris

UNITED STATES PATENT OFFICE.

CLINTON E. WOODS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

GRAPHOPHONE.

1,210,248.

Specification of Letters Patent.

Patented Dec. 26, 1916.

Application filed March 8, 1915. Serial No. 12,845.

To all whom it may concern:

Be it known that I, CLINTON E. WOODS, a citizen of the United States, and a resident of Bridgeport, Fairfield county, Connecticut, (whose post-office address is care of American Graphophone Co., Bridgeport, Connecticut,) have invented a new and useful Improvement in Graphophones, which invention is fully set forth in the following specification.

The invention relates particularly to machines of the type known as "polyphones", wherein two or more styli track tandem in the same record-groove.

The object of the present invention is to utilize the polyphone principle in such novel manner, in increasing the volume and in improving the quality of the reproductions obtained by the graphophone or other talking-machine, as to avoid sacrificing the accuracy of definition.

The invention is primarily applicable for use with records of the disk form having thereon a spirally-disposed record-groove of the laterally-undulating or "zigzag" type, although the invention may be applied to other types of record upon other forms of tablet.

One feature of the invention consists in pivoting the two or more independent stylus-supporting arms (preferably "tone-arms") upon independent axes located at equal distances from the center or axis of the rotary sound-record.

Another feature of the invention consists in locating the several styli at equal distances from the axes of their respective supporting-arms, preferably a distance equal to that from the center of the sound-record to each of the said axes.

A third feature of the invention consists in the employment, in connection with the separate and independent tone-arms, of separate and independent stationary sound-passages leading from the respective tone-arms to the outer air.

A fourth feature of the invention is brought into play only when the styli are out of engagement with the record, and consists of novel means for attaining the proper rela-

tive positioning of the several styli, so as to insure that they will enter and engage the same record-groove.

The invention consists further in certain features of construction and arrangement hereinafter set forth and claimed.

The invention is susceptible of embodiment in various forms, but will be best understood by reference to the annexed drawings in connection with the following description, wherein a preferred form of the invention is disclosed as comprising two independent tone-arms with their respective sound-boxes and styli cooperating simultaneously with a disk-tablet containing a spirally-disposed record-groove of the zigzag type.

In the drawings, Figure 1 is a plan view, indicating a portion of a talking-machine (of the inclosed-horn type) embodying one form of the invention; and Figs. 2 and 3 are details, in end and side view respectively, of the structure shown in Fig. 1.

In this particular embodiment, 1 represents a disk or flat tablet containing a spirally-disposed record-groove of the zigzag type, and carried by the usual turn-table, whose center post provides the axis of rotation or center 2.

3 indicates the inner (or left-hand) one of the two tone-arms, of the usual or any desired construction, and journaled in the usual manner, or as in U. S. Patent No. 1,108,302, so as to swing vertically and also to swing horizontally over the face of the record, upon the fixed axis 4, and carrying at its free end the usual sound-box 5. At the outer end is an elbow, so that the vertical diaphragm of this sound-box lies to one side (the right) of the main portion of the arm; and upon its face or outer side (at the right) is the usual stylus-bar, connected at its inner end to the face of the diaphragm and at its outer end carrying the stylus or needle 6, projecting forwardly and downwardly for engaging the spiral record-groove. Preferably, the distance from the operative tip of the stylus 6 to its axis 4 is equal to the distance between said axis 4 and the center 2. 7 represents the second tone-arm, of similar

construction, and similarly journaled upon its own fixed axis 8 located to one side of axis 4, and at the same distance from the center 2. This second tone-arm carries its own independent sound-box 9, offset to the left so as to lie as near as convenient to the first-named sound-box, and carrying its own stylus 10. The distance between stylus 10 and its axis 8, is the same as the distance between stylus 6 and its axis 4, each being preferably equal to the distance from center 2 to the two axes (4 and 8).

The two styli are caused to engage in the same outer convolution of the record-disk; and it will be seen that the stylus 10 lies slightly in advance of the stylus 6, and that the rotation of the spiral record-groove feeds the two styli simultaneously toward the center of the disk, in gradually-converging arcs (indicated by dotted lines). If desired, some other mounting of these parts may be employed so long as the two styli are thus presented tandem within the same convolution of the record-groove, and equidistant from their respective axes, and with said axes equidistant from center 2. The two diaphragms need not face the same way, nor need they be located substantially abreast of each other; but the best results are obtained by locating them substantially abreast and facing each other, in parallel relation, as shown. It is well known that in making these spiral record-grooves in the first instance, the tablet is rotated at a uniform axial speed, so that the surface-speed decreases in proportion to the approach toward the center or axis of the rotating disk; and, as a consequence, given sounds recorded near the periphery will occupy greater length of groove than if recorded nearer the axis of the disk; or, put another way, the record of a given sound-wave nearer the edge of the disk is longer than the record of the same wave nearer the center of the disk. Geometrically stated, the groove-length occupied by a given sound-wave depends directly upon its distance radially from the center of the rotating record-disk.

Referring, now, to Fig. 1, the two arms 4—6 and 8—10 are made of equal length, their two axes 4 and 8 are located that same distance from the axis or center 2 of the rotating record, and the two styli 6 and 10 are fed by the spiral record-groove so as to be at all times (practically) equidistant from said center 2; hence the two styli at all times subtend the same angle from the center 2 (the same as the angle 4—2—8); and that means that the distance between the two styli—just like the groove-length of a given sound-wave—depends directly upon their common distance from said center 2. In short, with respect to the recorded sound-waves, the two styli are at all times the

same relative distance apart. It is to be understood, of course, that more or less departure from the exact equalities of distance above referred to, will not be a departure from the invention.

In the preferred form of the invention, means are provided for permitting ready positioning of the two styli in commencing to play the record. A preferred device of the character is illustrated in the drawings, in which 11 represents a lateral bracket extending rigidly from one of the two arms, as 3, and carrying at its outer end the depending roller or stud 12. Beneath the other arm 7 is secured a plate 13 having the curved cam-groove which loosely receives the stud 12. A gripping-arm 14 is pivotally secured upon the cam-plate 13, and at its outer end is provided with the thumb-plate 15, and normally held retracted by a spring 16.

In starting to play a record, the operator lifts the outer end or elbow of the outer tone-arm 7, in the usual manner for positioning the ordinary single sound-box and stylus, whereby the other sound-box is also lifted, but the tip of its stylus will then hang down somewhat lower than the tip of the outer stylus 10; next, he swings the two arms outward, above the beginning of the record-groove, and then presses against thumb-plate 15, which brings the two styli into approximate alinement; next, he gently lowers the two arms until the lower (and inner) stylus 6 engages the desired record-groove; and, thereafter, he moves the other stylus 10 into proper alinement while lowering it into the same groove. As soon as this second stylus, 10, is seated, the thumb-plate is at once released, and the spring 16 instantly retracts the arm 14, thus leaving room for whatever lateral play of stud 12 may be required by the two styli in properly tracking the record-groove.

The proper curve of the cam-wall can be easily plotted, as by securing a blank beneath arm 7, carefully positioning the two independently-swinging styli in the outer convolution of the rotated record-groove, and then starting the machine and tracing upon said blank the path of the stud 12.

If desired the gripping-arm can be omitted; indeed, the entire outer limb of plate 13 (which serves as the left-hand wall inclosing the slot) can be omitted,—there being retained only the cam-face that constitutes the right-hand wall of the slot. And, indeed, the connecting-devices 11—12 and 13 can be entirely dispensed with and the two tone-arms positioned by hand.

17—17 represents the stationary sound-conveyer or "concealed horn" leading from tone-arm 3 to the outer air; while 18—18 represents a similar passageway leading in-

dependently from the other tone-arm to the outer air. The reproduction seems more pleasing when there are thus two entirely separate passages; but, if desired, there may be a single sound-emitting passageway with which both tone-arms communicate. Or, if desired, the tone-arms may communicate with one visible horn, or separately with two such horns.

In the foregoing description, with the annexed drawings, is set forth merely one preferred embodiment of the broad invention, which is susceptible of embodiment in other modifications. Further, it must be understood that the invention is not limited to the precise construction and arrangement of parts, which have been set forth in detail merely for the sake of clearness; and that parts may be transposed, or some of the parts omitted altogether, without departing from the spirit of the invention.

Having thus described the invention, what is claimed is:

1. The combination, in a talking-machine, of a turn-table, two arms pivoted on separate axes at equal distances from the center of said turn-table to swing freely over the same, and a stylus carried by each arm at that same distance from its axis.

2. The combination, in a talking-machine, of a turn-table, a plurality of independent arms mounted upon vertical axes located adjacent each other and on the same side of the turn-table, whereby said arms can swing freely in a horizontal plane, a stylus carried by each arm equidistant from the axis thereof, and said axes being equidistant from the center of said turn-table, whereby said styli can be propelled in continuously-converging paths.

3. The combination, in a talking-machine, of a turn-table, a plurality of rigid arms pivoted upon separate axes located adjacent each other on the same side of the turn-table and equidistant from the center of said turn-table, and an independent sound-box and stylus carried upon each arm and adapted to be propelled in continuously-converging paths as well as vibrated by a record-groove carried by said turn-table.

4. The combination, in a talking-machine, of a turn-table, a plurality of freely-swinging arms each pivoted separately on a fixed axis, said axes being located adjacent each other on the same side of the turn-table, and a stylus on the free end of each arm equidistant from the axis thereof, said styli adapted to simultaneously engage a record-groove carried by said turn-table and to be propelled in continuously-converging paths as well as vibrated thereby.

5. The combination, in a talking-machine, of a disk-record and a plurality of independent sound-boxes swinging upon sepa-

rate axes that are located adjacent each other on the same side of the disk and equidistant from the center of said disk, whereby the styli of said sound-boxes are propelled in continuously-converging paths.

6. The combination, with a rotary tablet carrying a spirally-disposed record-groove, of two styli mounted to be vibrated and propelled by said rotating groove and at all times spaced from each other by the same relative distance with respect to the recorded undulations corresponding to the sound-waves.

7. The combination, in a talking-machine, of a turn-table carrying a spirally-disposed record-groove, and a plurality of styli mounted to be fed simultaneously in continuously-converging paths across said tablet by said groove.

8. The combination, in a talking-machine, of a swinging-arm carrying a stud rigidly secured thereto, a sound-box on the end of said arm, a second swinging-arm carrying a member rigidly secured thereto having a groove for engaging said stud, and a second sound-box on the end of the second arm aforesaid.

9. In a talking-machine adapted to carry a rotary tablet having a spirally-disposed record-groove, a plurality of sound-boxes independently mounted to travel across said tablet in continuously-converging paths and with their respective styli adapted to simultaneously engage in tandem relation within the same convolution of said grooves, whereby they can be propelled simultaneously across said tablet by said rotating spiral groove while being vibrated by the irregularities thereof.

10. The combination, in a talking-machine, of two independently-mounted swinging-arms, a sound-box with its stylus on the free end of each arm, and a self-adjusting mechanical connection for said arms consisting of a bearing-surface carried rigidly by one arm and a co-acting abutting-member carried rigidly by the other.

11. The combination, in a talking-machine, of a plurality of independently-mounted swinging-arms each carrying a sound-box and stylus at its free end, and co-acting members carried rigidly on said arms for obtaining proper alinement of said styli.

12. The combination, in a talking-machine, of a rotary tablet containing a spirally-disposed record-groove, a plurality of independently-mounted and horizontally-swinging sound-conveying members pivoted adjacent each other on the same side of said tablet, a separate stationary sound-passage leading from each member to the outer air, and a sound-box on the free end of each swinging-member aforesaid with the respec-

tive styli thereof simultaneously engaging said record-groove, whereby said styli can be propelled in continuously-converging paths.

13. The combination, in a talking-machine, of a rotary tablet containing a spirally-disposed record-groove, a plurality of independently-mounted and horizontally-swinging sound-conveying members, a separate stationary sound-passage leading from each member to the outer air, a sound-box on the free end of each swinging-member

aforesaid with the respective styli thereof simultaneously engaging said record-groove, and means for obtaining proper alinement of said styli.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CLINTON E. WOODS.

Witnesses:

LAURETTA T. NEAL,
FRANK C. HINCKLEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

NUMERICAL LIST

OF

DESIGN PATENTS.

GRAPHOPHONE PATENTS - VOLUME XVII.

1916

(39 Design patents)



VOLUME XVI.

GRAPHOPHONE DESIGN PATENTS.

January 1916

-

December 1916.

Design No.	48,591,	Grupe, W.F.,	February 22nd, 1916;
	48,592,	Horswell & Millikan,	Feb. 22, 1916;
	48,609,	Rotter, W.,	February 22nd, 1916;
	48,670,	Duffy, P.,	March 7th, 1916;
	48,671,	Duffy, P.,	March 7th, 1916;
	48,672,	Duffy, P.,	March 7th, 1916;
	48,673,	Duffy, P.,	March 7th, 1916;
	48,676,	Greene & Chatfield,	March 7, 1916;
	48,677,	Greene & Chatfield,	March 7, 1916;
	48,678,	Greene & Chatfield,	March 7, 1916;
	48,679,	Greene & Chatfield,	March 7, 1916;
	48,680,	Greene & Chatfield,	March 7th, 1916;
	48,681,	Greene & Chatfield,	March 7th, 1916;
	48,682,	Greene & Chatfield,	March 7th, 1916;
	48,683,	Greene & Chatfield,	March 7th, 1916;
	48,684,	Greene & Chatfield,	March 7th, 1916;
	48,685,	Greene & Chatfield,	March 7th, 1916;
	48,686,	Hochholzer, J.,	March 7th, 1916;
	48,938,	Jones, A.D.,	April 25, 1916;
	48,975,	Jones, A.D.,	May 2nd, 1916;
	48,976,	Jones, A.D.,	May 2nd, 1916;
	49,215,	Kieffer, E.T.,	June 20th, 1916;
	49,216,	Kieffer, E.T.,	June 20th, 1916;
	49,300,	Fischer, E.J.,	July 4th, 1916;
	49,519,	Horswell, P.A.,	Aug. 15th, 1916;
	49,524,	Ross, F.A.,	Aug. 15th, 1916;
	49,525,	Ross, F.A.,	Aug. 15th, 1916;
	49,526,	Ross, F.A.,	Aug. 15th, 1916;
	49,570,	Caldwell, W.D.,	Aug. 29th, 1916;
	49,571,	Caldwell, W.D.,	Aug. 29th, 1916;
	49,592,	Sheble, H.,	Aug. 29th, 1916;
	49,629,	Stewart, J.K.,	Sept. 5th, 1916;
	49,606,	Gist, D.W.,	Sept. 5th, 1916;
	49,654,	Moyer, H.C.,	Sept. 12th, 1916;
	49,655,	Moyer, H.C.,	Sept. 12th, 1916;
	49,739,	Heineman, O.,	Oct. 10th, 1916;
	49,912,	Virzi, J.,	Nov. 14th, 1916;
	50,072,	MacLachlan, L.,	Dec. 19th, 1916;
	50,073,	MacLachlan, L.,	Dec. 19th, 1916;

DESIGN.

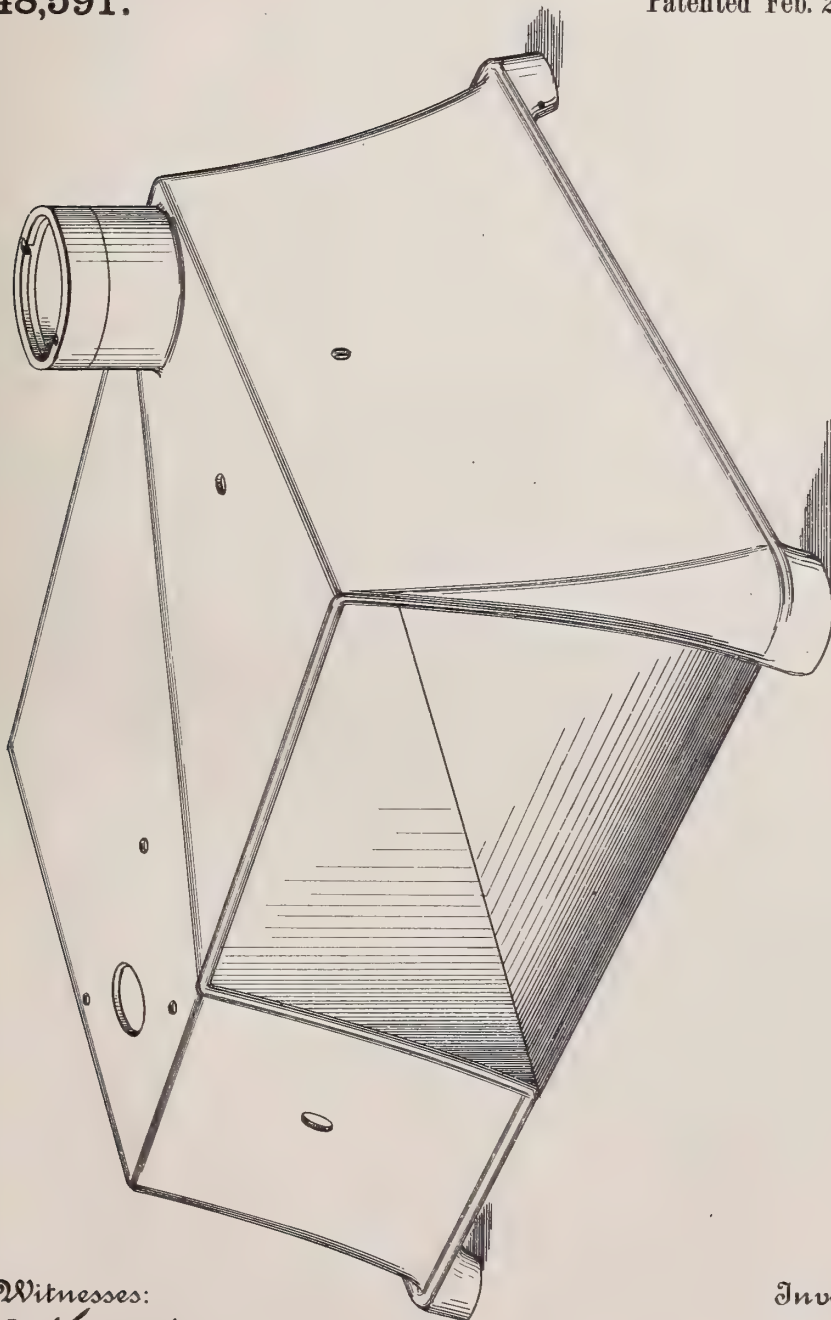
W. F. GRUPE.

CASING FOR PHONOGRAPHS OR TALKING MACHINES.

APPLICATION FILED FEB. 26, 1915.

48,591.

Patented Feb. 22, 1916.



Witnesses:

J. Konigsberg
L. M. Baedert

Inventor

William F. Grupe
By his Attorneys
Mastick & Lucke

UNITED STATES PATENT OFFICE.

WILLIAM F. GRUPE, OF JERSEY CITY, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO VAN-O-PHONE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

DESIGN FOR A CASING FOR PHONOGRAPHS OR TALKING-MACHINES.

48,591.

Specification for Design.

Patented Feb. 22, 1916.

Application filed February 26, 1915. Serial No. 11,368. Term of patent 14 years.

To all whom it may concern:

Be it known that I, WILLIAM F. GRUPE, a citizen of the United States, residing at Jersey City, county of Hudson, State of New Jersey, have invented a new, original, and ornamental Design for a Casing for Phonographs or Talking-Machines, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The figure is a perspective view of a casing for a phonograph or other talking machine, showing my design.

I claim:

The ornamental design for a casing for phonographs or talking machines, as shown.

WILLIAM F. GRUPE.

Witnesses:

HENRY J. LUCKE,
K. G. LEARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DESIGN.

P. A. HORSWELL & W. H. MILLIKAN.
TOY OR MINIATURE TALKING MACHINE.

APPLICATION FILED DEC. 9, 1915.

48,592.

Patented Feb. 22, 1916.

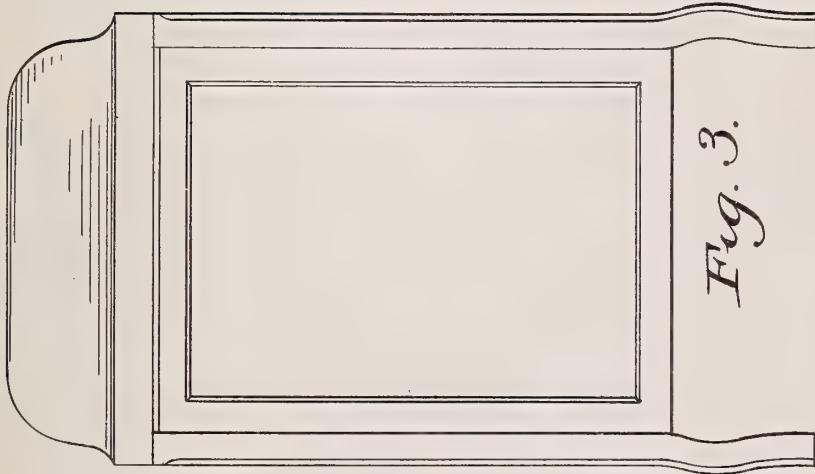


Fig. 3.

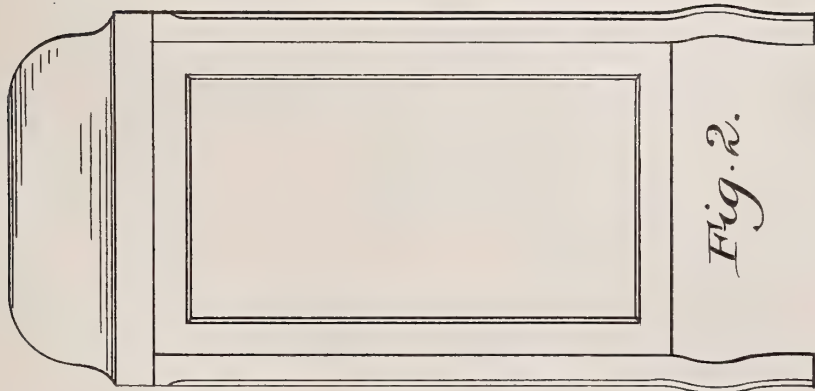


Fig. 2.

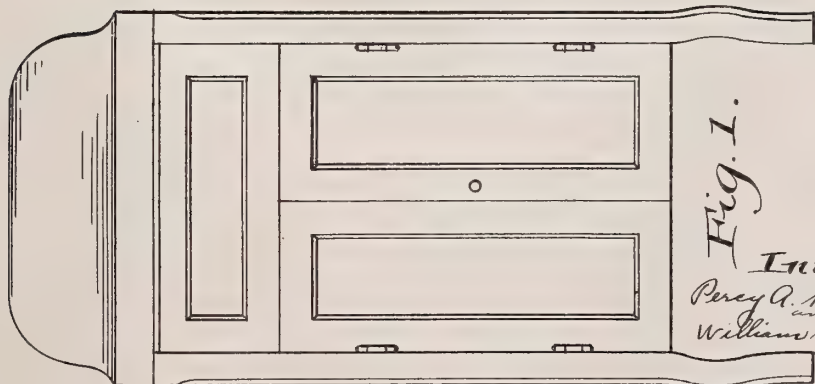


Fig. 1.

Inventors.
Percy A. Horswell
and
William H. Millikan
by
Thurston & Kwis
Attys.

UNITED STATES PATENT OFFICE.

PERCY A. HORSWELL, OF CLEVELAND, AND WILLIAM H. MILLIKAN, OF LAKEWOOD, OHIO, ASSIGNORS TO THE AMERICAN WONDERLAND CO., OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

DESIGN FOR A TOY OR MINIATURE TALKING-MACHINE.

48,592.

Specification for Design.

Patented Feb. 22, 1916.

Application filed December 9, 1915. Serial No. 66,017. Term of patent 7 years.

To all whom it may concern:

Be it known that we, PERCY A. HORSWELL and WILLIAM H. MILLIKAN, citizens of the United States, residing, respectively, at 1861 East Ninetieth street, Cleveland, and 1508 Lincoln avenue, Lakewood, both in the county of Cuyahoga, State of Ohio, United States of America, have invented a new, original, and ornamental Design for a Toy or Miniature Talking-Machine, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

In said drawings, Figure 1 is a front view; Fig. 2 is a side view; and Fig. 3 is a rear view, all figures showing our new design.

We claim:

The ornamental design for a toy or miniature talking machine, substantially as shown.

PERCY A. HORSWELL.
WILLIAM H. MILLIKAN.

Witnesses:

C. V. SCHURGER,
M. M. ROYAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DESIGN.

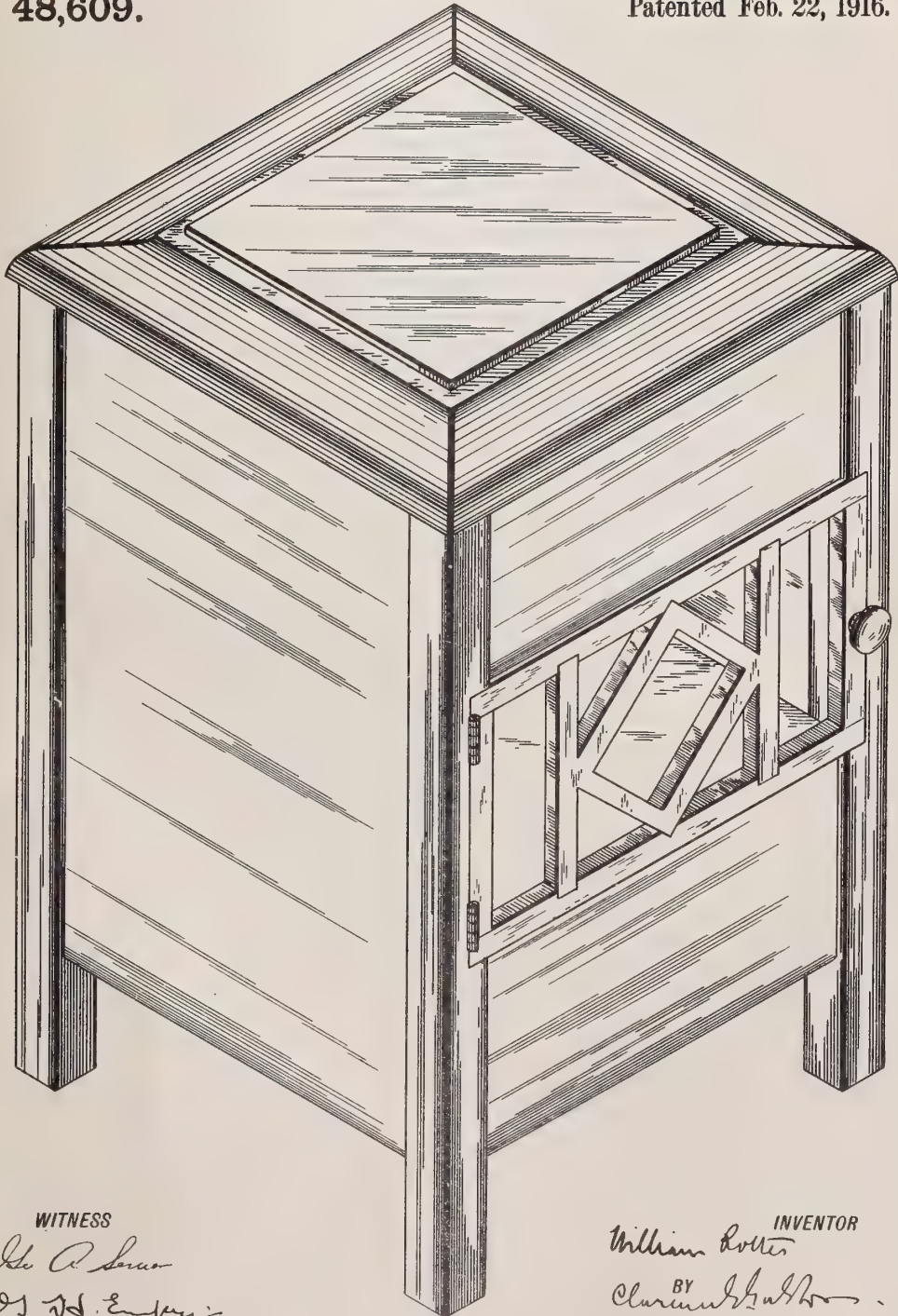
W. ROTTER.

TALKING MACHINE CABINET.

APPLICATION FILED DEC. 17, 1915.

48,609.

Patented Feb. 22, 1916.



WITNESS

Wm. A. Larson
J. H. Emery

INVENTOR

William Rotter
BY
Charles H. Hubbs
ATTORNEY

UNITED STATES PATENT OFFICE.

WILLIAM ROTTER, OF NEW YORK, N. Y.

DESIGN FOR A TALKING-MACHINE CABINET.

48,609.

Specification for Design.

Patented Feb. 22, 1916.

Application filed December 17, 1915. Serial No. 67,479. Term of patent 7 years.

To all whom it may concern:

Be it known that I, WILLIAM ROTTER, a citizen of the United States, residing in the borough of Bronx, city of New York, in the county of Bronx and State of New York, (whose post-office address is No. 7 West Twenty-second street, New York city, State of New York,) have invented a new, original, and ornamental Design for a Talking-Machine Cabinet, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The figure is a perspective view of a talking machine cabinet showing my new design.

I claim:

The ornamental design for a talking machine cabinet, as shown.

Dated, December 14th, 1915.

WILLIAM ROTTER.

Witnesses:

ROBERT C. BIRCHALIN,
CLARENCE G. GALT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

THE UNITED STATES OF AMERICA

IN SENATE
January 1, 1901

REPORT
OF THE
COMMISSIONER OF THE GENERAL LAND OFFICE
FOR THE YEAR 1900
IN RESPONSE TO A RESOLUTION PASSED BY THE SENATE
JANUARY 1, 1898
AND BY THE HOUSE OF REPRESENTATIVES
MAY 1, 1898
AND BY THE SENATE
JANUARY 1, 1900
AND BY THE HOUSE OF REPRESENTATIVES
MAY 1, 1900
AND BY THE SENATE
JANUARY 1, 1901
AND BY THE HOUSE OF REPRESENTATIVES
MAY 1, 1901

DESIGN.

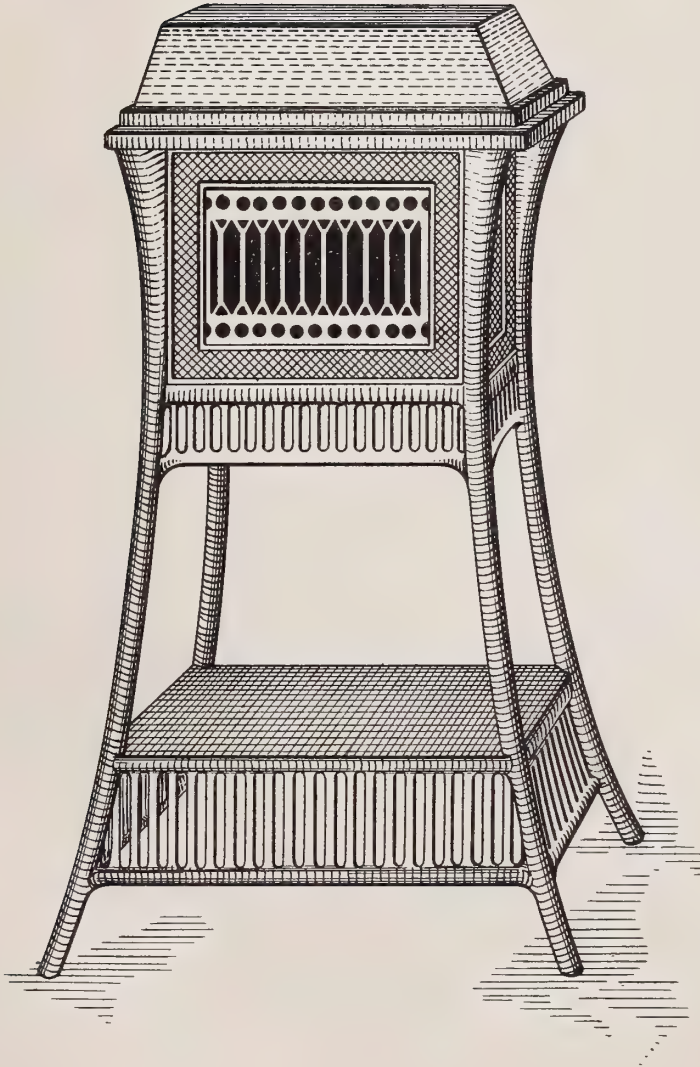
P. DUFFY.

TALKING MACHINE CABINET.

APPLICATION FILED JAN. 11, 1916.

48,670.

Patented Mar. 7, 1916.



Witness:-
Thos K. Inne,

Inventor
Peter Duffy.
By *his Attorney*
E. J. Neely

UNITED STATES PATENT OFFICE.

PETER DUFFY, OF NEW YORK, N. Y.

DESIGN FOR A TALKING-MACHINE CABINET.

48,670.

Specification for Design.

Patented Mar. 7, 1916.

Application filed January 11, 1916. Serial No. 71,586. Term of patent 7 years.

To all whom it may concern:

Be it known that I, PETER DUFFY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new, original, and ornamental Design for Talking-Machine Cabinets, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The drawing is a perspective view of a

talking machine cabinet showing my new design.

I claim as my invention:

The ornamental design for a talking machine cabinet, substantially as shown.

Signed at New York, in the county of New York and State of New York, this 23rd day of December, 1915.

PETER DUFFY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

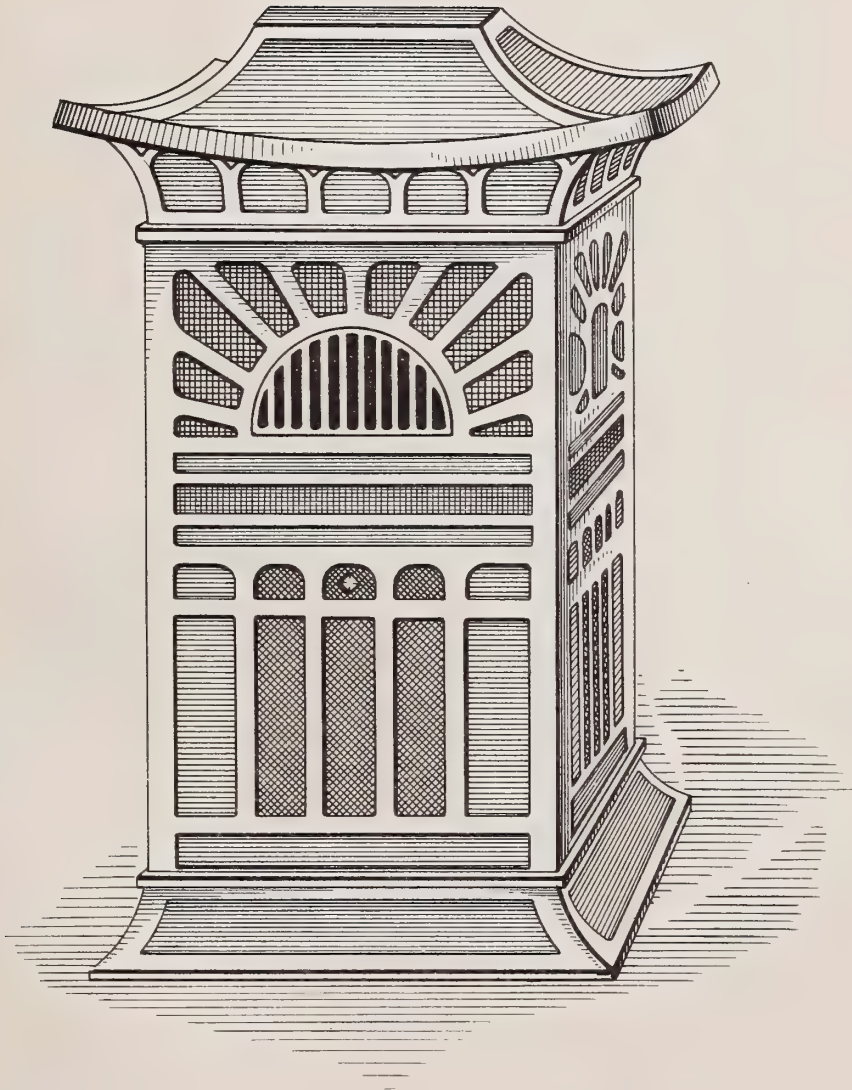
DESIGN.

P. DUFFY.

TALKING MACHINE CABINET.
APPLICATION FILED JAN. 11, 1916.

48,671.

Patented Mar. 7, 1916.



Witness:-
Titus H. Jones

Inventor
Peter Duffy
By *his Attorney*
E. H. Reed

UNITED STATES PATENT OFFICE.

PETER DUFFY, OF NEW YORK, N. Y.

DESIGN FOR A TALKING-MACHINE CABINET.

48,671.

Specification for Design.

Patented Mar. 7, 1916.

Application filed January 11, 1916. Serial No. 71,587. Term of patent 7 years.

To all whom it may concern:

Be it known that I, PETER DUFFY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new, original, and ornamental Design for Talking-Machine Cabinets, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The drawing is a perspective view of a

talking machine cabinet showing my new design.

I claim as my invention:

The ornamental design for a talking machine cabinet, substantially as shown.

Signed at New York, in the county of New York and State of New York, this 23rd day of December, 1915.

PETER DUFFY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

UNITED STATES GOVERNMENT

OFFICE OF THE SECRETARY OF THE INTERIOR

DEPARTMENT OF THE INTERIOR

WASHINGTON

THE SECRETARY OF THE INTERIOR, DEPARTMENT OF THE INTERIOR, WASHINGTON, D. C.

TO THE SECRETARY OF THE INTERIOR, DEPARTMENT OF THE INTERIOR, WASHINGTON, D. C.

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THE SECRETARY OF THE INTERIOR, DEPARTMENT OF THE INTERIOR, WASHINGTON, D. C.

THE SECRETARY OF THE INTERIOR

DESIGN.

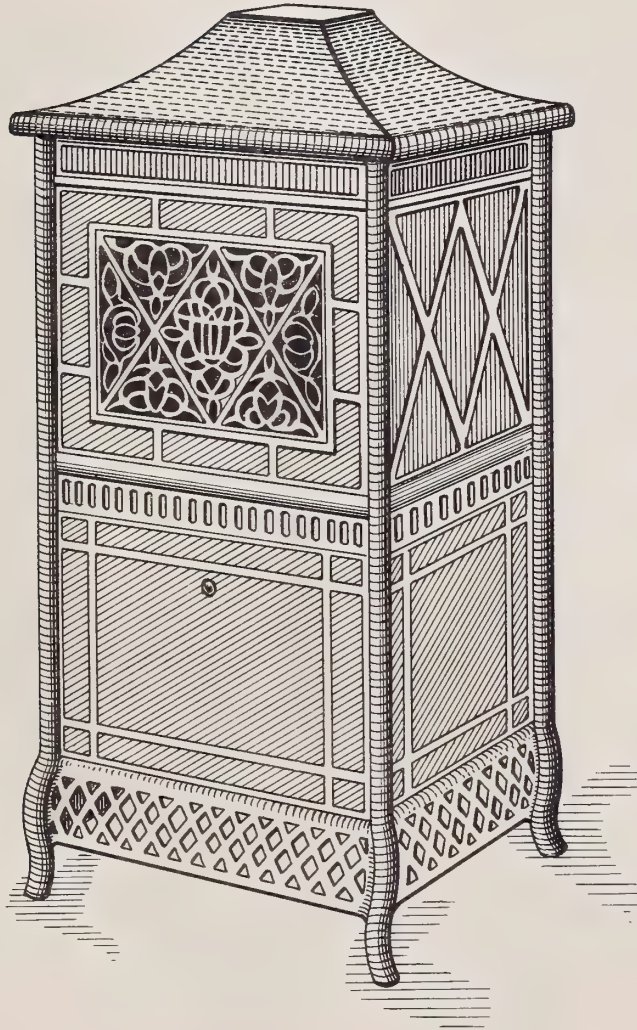
P. DUFFY.

TALKING MACHINE CABINET.

APPLICATION FILED JAN. 11, 1916.

48,672.

Patented Mar. 7, 1916.



Witness:-

John H. Jones

Inventor

Peter Duffy

By his Attorney

E. H. Reed

UNITED STATES PATENT OFFICE.

PETER DUFFY, OF NEW YORK, N. Y.

DESIGN FOR A TALKING-MACHINE CABINET.

48,672.

Specification for Design.

Patented Mar. 7, 1916.

Application filed January 11, 1916. Serial No. 71,588. Term of patent 7 years.

To all whom it may concern:

Be it known that I, PETER DUFFY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new, original, and ornamental Design for Talking-Machine Cabinets, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The drawing is a perspective view of a

talking machine cabinet showing my new design.

I claim as my invention:

The ornamental design for a talking machine cabinet, substantially as shown.

Signed at New York, in the county of New York and State of New York, this 23rd day of December, 1915.

PETER DUFFY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DESIGN.

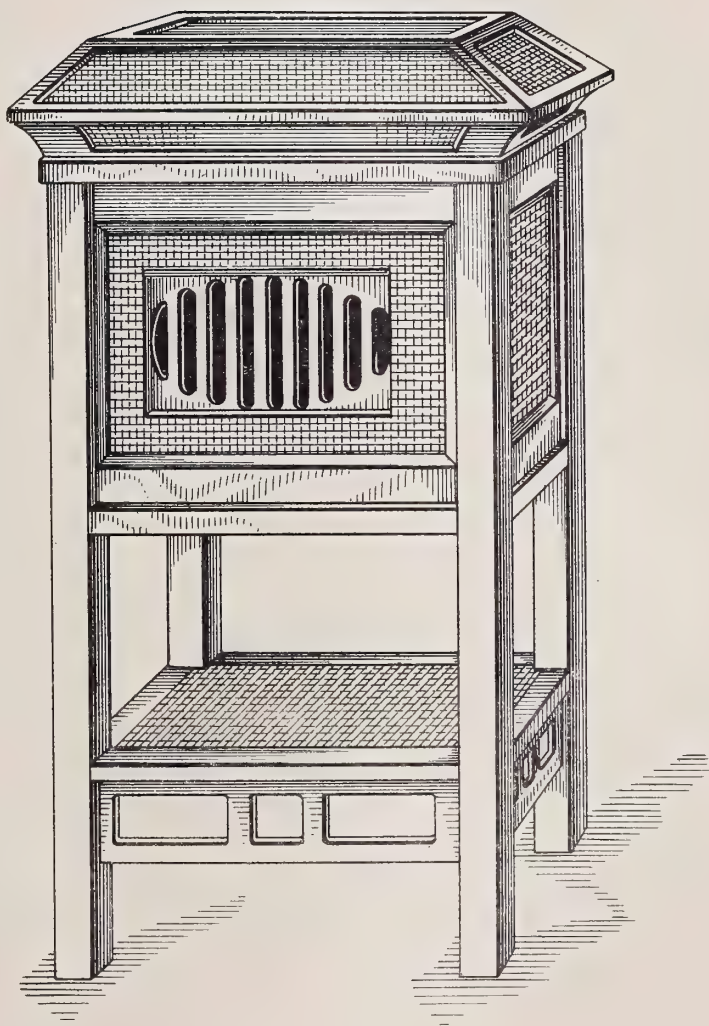
P. DUFFY.

TALKING MACHINE CABINET.

APPLICATION FILED JAN. 11, 1916.

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Patented Mar. 7, 1916.



Witness:-
John H. Jones

Inventor
Peter Duffy
By his Attorney.
C. H. Reed

UNITED STATES PATENT OFFICE.

PETER DUFFY, OF NEW YORK, N. Y.

DESIGN FOR A TALKING-MACHINE CABINET.

48,673.

Specification for Design.

Patented Mar. 7, 1916.

Application filed January 11, 1916. Serial No. 71,589. Term of patent 7 years.

To all whom it may concern:

Be it known that I, PETER DUFFY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new, original, and ornamental Design for Talking-Machine Cabinets, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The drawing is a perspective view of a

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I claim as my invention:

The ornamental design for a talking machine cabinet, substantially as shown.

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PETER DUFFY.

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THE UNIVERSITY OF CHICAGO

OFFICE OF THE DEAN OF STUDENTS

540 EAST 58TH STREET, CHICAGO, ILL. 60637

NAME _____ ADDRESS _____ CITY _____ STATE _____ ZIP _____

TELEPHONE _____ FAX _____

DATE _____

TO THE DEAN OF STUDENTS:

I am writing to you regarding my son/daughter, _____, who is currently a student at the University of Chicago. He/She is currently in the _____ class and is planning to graduate in _____.

He/She has been very successful in his/her studies and has been a member of several organizations on campus. He/She has also been involved in several community service projects and has been a very active member of the campus community.

I am proud of his/her accomplishments and am confident that he/she will continue to excel in his/her studies and in his/her life.

I am writing to you to request that you please consider his/her application for admission to the University of Chicago for the next academic year. He/She has been accepted by several other universities, but he/she has chosen the University of Chicago because of its excellent reputation and its commitment to academic excellence.

I am confident that he/she will be a valuable member of the University of Chicago community and will continue to excel in his/her studies and in his/her life.

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I am confident that he/she will be a valuable member of the University of Chicago community and will continue to excel in his/her studies and in his/her life.

Very truly yours,

Signature of Parent/Guardian _____

Print Name of Parent/Guardian _____

DESIGN.

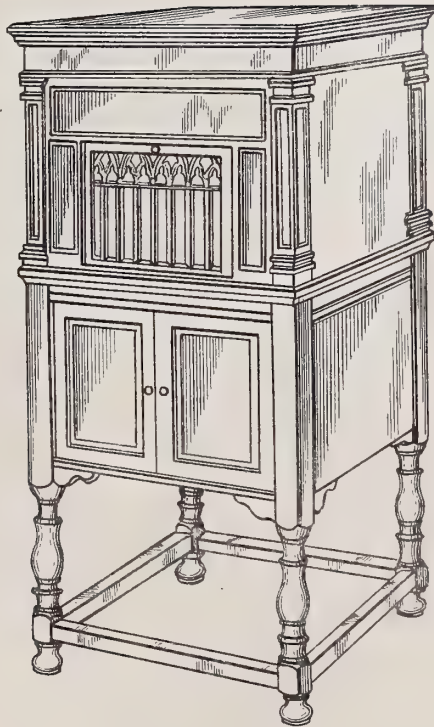
H. B. GREENE & H. F. CHATFIELD.

CABINET FOR PHONOGRAPHS.

APPLICATION FILED JAN. 8, 1916.

48,676.

Patented Mar. 7, 1916.



Harry Bloomfield Greene
INVENTORS
and
Henry Finch Chatfield
BY
E. W. Schenck ATTORNEY



UNITED STATES PATENT OFFICE.

HARRY BLOOMFIELD GREENE, OF HASBROUCK HEIGHTS, NEW JERSEY, AND HENRY FINCH CHATFIELD, OF MOUNT VERNON, NEW YORK.

DESIGN FOR A CABINET FOR PHONOGRAPHS.

48,676.

Specification for Design.

Patented Mar. 7, 1916.

Application filed January 8, 1916. Serial No. 71,110. Term of patent 14 years.

To all whom it may concern:

Be it known that we, HARRY BLOOMFIELD GREENE and HENRY FINCH CHATFIELD, citizens of the United States, residing, respectively, in Hasbrouck Heights, Bergen county, State of New Jersey, and in Mount Vernon, Westchester county, State of New York, have invented a new, original, and ornamental Design for Cabinets for Phonographs, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The figure is a perspective view of a cabinet for phonographs illustrating our new design.

We claim:

The ornamental design for a cabinet for a phonograph substantially as shown.

In testimony whereof we have hereunto signed this specification.

HARRY BLOOMFIELD GREENE.
HENRY FINCH CHATFIELD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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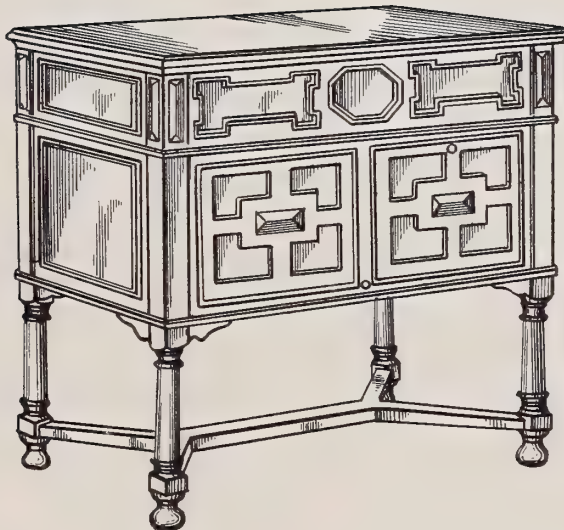
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BY
E. W. Scherr ATTORNEY

UNITED STATES PATENT OFFICE.

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DESIGN FOR A CABINET FOR PHONOGRAPHS.

48,677.

Specification for Design.

Patented Mar. 7, 1916.

Application filed January 8, 1916. Serial No. 71,111. Term of patent 14 years.

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HENRY FINCH CHATFIELD.

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THE HISTORY OF THE UNITED STATES

OF THE UNITED STATES OF AMERICA
FROM THE FIRST SETTLEMENTS TO THE PRESENT TIME
BY JAMES M. SMITH
IN TWO VOLUMES
VOL. I
FROM THE FIRST SETTLEMENTS TO THE END OF THE SEVENTEENTH CENTURY
NEW YORK: PUBLISHED BY J. B. LIPPINCOTT, 15 N. 2ND ST. 1850

Entered according to Act of Congress, in the year 1849, in the Clerk's Office of the District Court of the Southern District of New York, by J. B. Lippincott, in the name of the Author.

DESIGN.

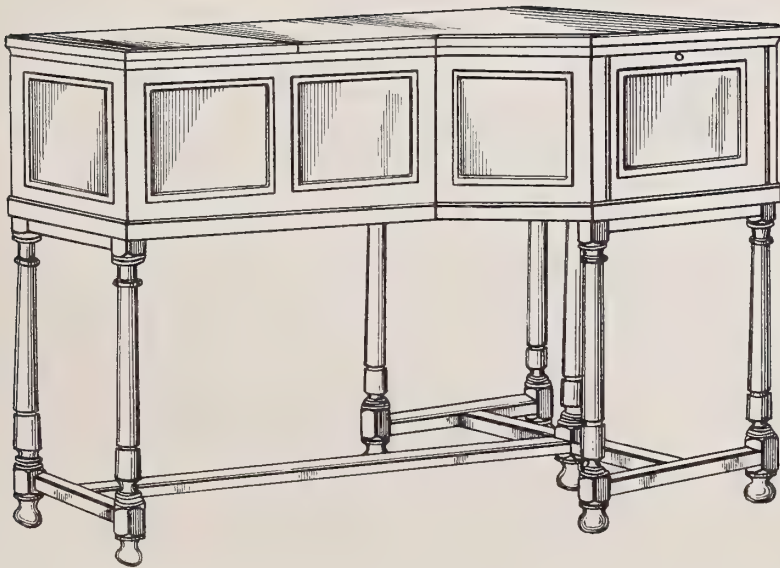
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APPLICATION FILED JAN. 8, 1916.

48,678.

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Harry Bloomfield Greene
INVENTORS
And
Henry Frick Chatfield
BY
E. W. Schenck ATTORNEY



UNITED STATES PATENT OFFICE.

HARRY BLOOMFIELD GREENE, OF HASBROUCK HEIGHTS, NEW JERSEY, AND HENRY FINCH CHATFIELD, OF MOUNT VERNON, NEW YORK.

DESIGN FOR A CABINET FOR PHONOGRAPHS.

48,678.

Specification for Design.

Patented Mar. 7, 1916.

Application filed January 8, 1916. Serial No. 71,112. Term of patent 14 years.

To all whom it may concern:

Be it known that we, HARRY BLOOMFIELD GREENE and HENRY FINCH CHATFIELD, citizens of the United States, residing, respectively, in Hasbrouck Heights, Bergen county, State of New Jersey, and in Mount Vernon, Westchester county, State of New York, have invented a new, original, and ornamental Design for Cabinets for Phonographs, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

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HARRY BLOOMFIELD GREENE.
HENRY FINCH CHATFIELD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."

THE STATE OF TEXAS

County of _____ State of Texas

Know all men by these presents, that _____

of the County of _____ State of Texas, for and in consideration of the sum of _____ Dollars, to _____ of the County of _____ State of Texas, the receipt of which is hereby acknowledged, have granted, sold and conveyed, and by these presents do grant, sell and convey unto the said _____ of the County of _____ State of Texas, all that certain _____

DESIGN.

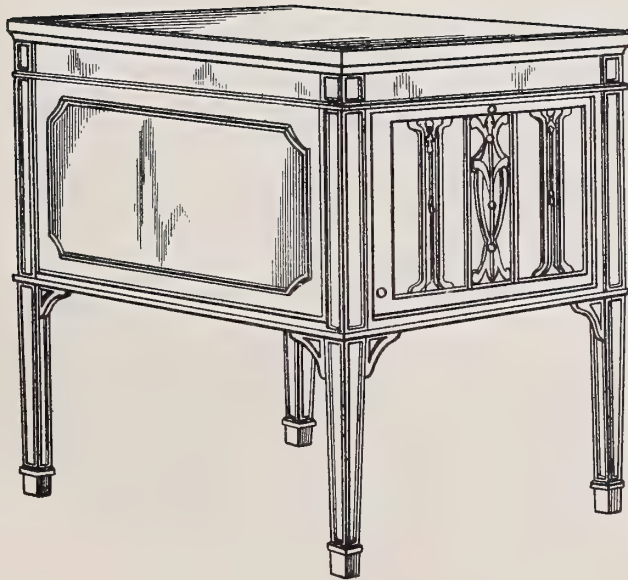
H. B. GREENE & H. F. CHATFIELD.

CABINET FOR PHONOGRAPHS.

APPLICATION FILED JAN. 8, 1916.

48,679.

Patented Mar. 7, 1916.



Harry Bloomfield Greene
INVENTORS
and
Henry Finch Chatfield
BY
Forckner & ATTORNEY

UNITED STATES PATENT OFFICE.

HARRY BLOOMFIELD GREENE, OF HASBROUCK HEIGHTS, NEW JERSEY, AND HENRY FINCH CHATFIELD, OF MOUNT VERNON, NEW YORK.

DESIGN FOR A CABINET FOR PHONOGRAPHS.

48,679.

Specification for Design.

Patented Mar. 7, 1916.

Application filed January 8, 1916. Serial No. 71,113. Term of patent 14 years.

To all whom it may concern:

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HENRY FINCH CHATFIELD.

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THE UNIVERSITY OF CHICAGO

THE UNIVERSITY OF CHICAGO
DIVISION OF THE PHYSICAL SCIENCES
DEPARTMENT OF CHEMISTRY

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DEPARTMENT OF CHEMISTRY

THE UNIVERSITY OF CHICAGO
DIVISION OF THE PHYSICAL SCIENCES
DEPARTMENT OF CHEMISTRY

DESIGN.

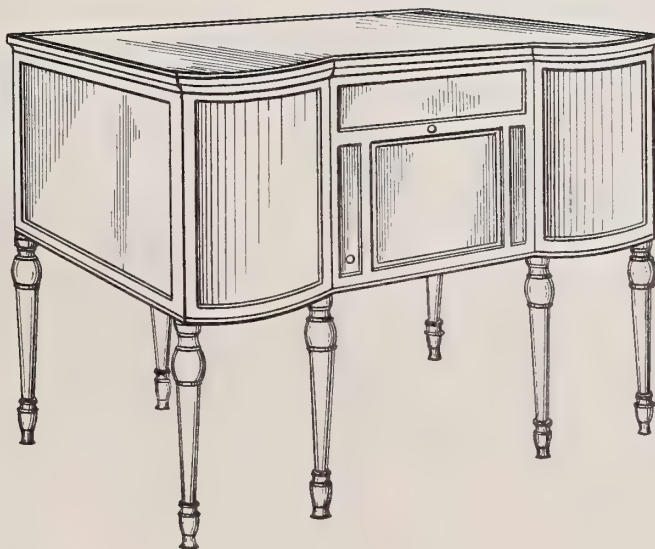
H. B. GREENE & H. F. CHATFIELD.

CABINET FOR PHONOGRAPHS.

APPLICATION FILED JAN. 8, 1916.

48,680.

Patented Mar. 7, 1916.



Harry Bloomfield Greene
INVENTORS
And
Henry Finch Chatfield
BY
E. J. Eickherr
ATTORNEY

UNITED STATES PATENT OFFICE.

HARRY BLOOMFIELD GREENE, OF HASBROUCK HEIGHTS, NEW JERSEY, AND HENRY FINCH CHATFIELD, OF MOUNT VERNON, NEW YORK.

DESIGN FOR A CABINET FOR PHONOGRAPHS.

48,680.

Specification for Design.

Patented Mar. 7, 1916.

Application filed January 8, 1916. Serial No. 71,114. Term of patent 14 years.

To all whom it may concern:

Be it known that we, HARRY BLOOMFIELD GREENE and HENRY FINCH CHATFIELD, citizens of the United States, residing, respectively, in Hasbrouck Heights, Bergen county, State of New Jersey, and in Mount Vernon, Westchester county, State of New York, have invented a new, original, and ornamental Design for Cabinets for Phonographs, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

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HARRY BLOOMFIELD GREENE.
HENRY FINCH CHATFIELD.

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THE HISTORY OF THE UNITED STATES

The history of the United States is a story of growth and change. It begins with the first settlers who came to the Americas in search of a new life. They found a land of opportunity, but also a land of challenge. The early years were marked by conflict and struggle, as the settlers fought to establish a new society. Over time, the United States grew from a small colony into a powerful nation. It has faced many challenges, but it has always emerged stronger and more united. The story of the United States is a story of hope and achievement. It is a story that inspires us to strive for a better future.

7)

DESIGN.

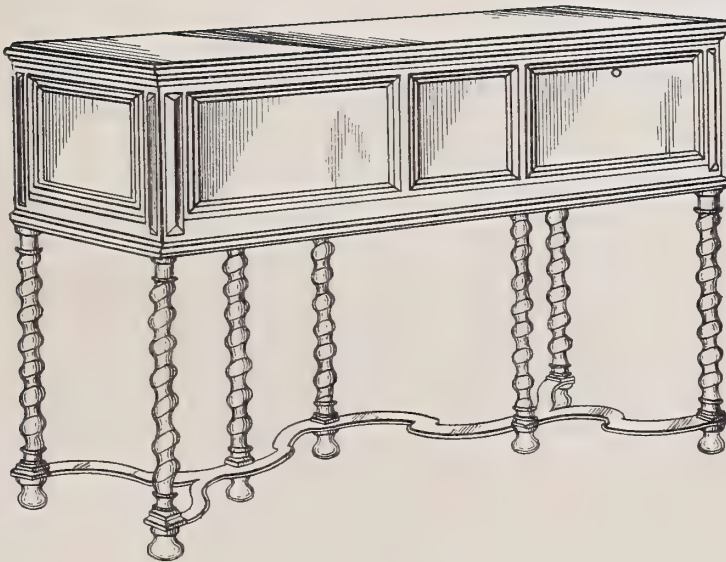
H. B. GREENE & H. F. CHATFIELD.

CABINET FOR PHONOGRAPHS.

APPLICATION FILED JAN. 8, 1916.

48,681.

Patented Mar. 7, 1916.



Harry Bloomfield Greene
INVENTORS
and
Henry Finch Chatfield
BY
E. W. Eichen ATTORNEY



UNITED STATES PATENT OFFICE.

HARRY BLOOMFIELD GREENE, OF HASBROUCK HEIGHTS, NEW JERSEY, AND HENRY FINCH CHATFIELD, OF MOUNT VERNON, NEW YORK.

DESIGN FOR A CABINET FOR PHONOGRAPHS.

48,681.

Specification for Design.

Patented Mar. 7, 1916.

Application filed January 8, 1916. Serial No. 71,115. Term of patent 14 years.

To all whom it may concern:

Be it known that we, HARRY BLOOMFIELD GREENE and HENRY FINCH CHATFIELD, citizens of the United States, residing, respectively, in Hasbrouck Heights, Bergen county, State of New Jersey, and in Mount Vernon, Westchester county, State of New York, have invented a new, original, and ornamental Design for Cabinets for Phonographs, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

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In testimony whereof we have hereunto signed this specification.

HARRY BLOOMFIELD GREENE.
HENRY FINCH CHATFIELD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

UNITED STATES PATENT OFFICE

INVENTOR: [Faint text, likely the name of the inventor]

BY: [Faint text, likely the name of the attorney or agent]

WITNESSES: [Faint text, likely the names of witnesses]

ATTEST: [Faint text, likely the name of the official]

Given under my hand and the seal of the said Office, this [faint] day of [faint] 19[]

DESIGN.

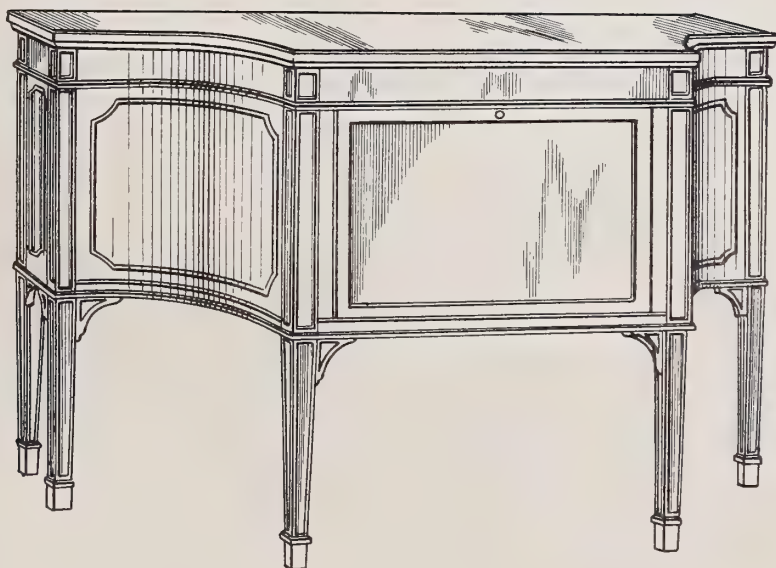
H. B. GREENE & H. F. CHATFIELD.

CABINET FOR PHONOGRAPHS.

APPLICATION FILED JAN. 8, 1916.

48,682.

Patented Mar. 7, 1916.



Harry Bloomfield Greene
and
Henry Finch Chatfield
INVENTORS
BY
E. W. Schenck
ATTORNEY

UNITED STATES PATENT OFFICE.

HARRY BLOOMFIELD GREENE, OF HASBROUCK HEIGHTS, NEW JERSEY, AND HENRY FINCH CHATFIELD, OF MOUNT VERNON, NEW YORK.

DESIGN FOR A CABINET FOR PHONOGRAPHS.

48,682.

Specification for Design.

Patented Mar. 7, 1916.

Application filed January 8, 1916. Serial No. 71,116. Term of patent 14 years.

To all whom it may concern:

Be it known that we, HARRY BLOOMFIELD GREENE and HENRY FINCH CHATFIELD, citizens of the United States, residing, respectively, in Hasbrouck Heights, Bergen county, State of New Jersey, and in Mount Vernon, Westchester county, State of New York, have invented a new, original, and ornamental Design for Cabinets for Phonographs, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

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HARRY BLOOMFIELD GREENE.
HENRY FINCH CHATFIELD.

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THE HISTORY OF THE CITY OF BOSTON

CHAPTER I. OF THE FIRST SETTLEMENT OF THE CITY.	
1630	The first settlement of the city by the Puritans.
1631	The first meeting of the town.
1632	The first church of the city.
1633	The first school of the city.
1634	The first hospital of the city.
1635	The first library of the city.
1636	The first printing-house of the city.
1637	The first theatre of the city.
1638	The first university of the city.
1639	The first academy of the city.
1640	The first college of the city.
1641	The first seminary of the city.
1642	The first divinity school of the city.
1643	The first law school of the city.
1644	The first medical school of the city.
1645	The first school of divinity of the city.
1646	The first school of law of the city.
1647	The first school of medicine of the city.
1648	The first school of divinity of the city.
1649	The first school of law of the city.
1650	The first school of medicine of the city.
1651	The first school of divinity of the city.
1652	The first school of law of the city.
1653	The first school of medicine of the city.
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1655	The first school of law of the city.
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1657	The first school of divinity of the city.
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1693	The first school of divinity of the city.
1694	The first school of law of the city.
1695	The first school of medicine of the city.
1696	The first school of divinity of the city.
1697	The first school of law of the city.
1698	The first school of medicine of the city.
1699	The first school of divinity of the city.
1700	The first school of law of the city.

DESIGN.

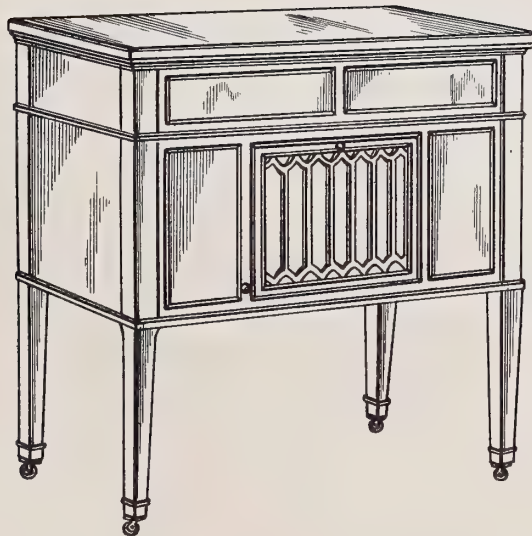
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CABINET FOR PHONOGRAPHS.

APPLICATION FILED JAN. 8, 1916.

48,683.

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UNITED STATES PATENT OFFICE.

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DESIGN FOR A CABINET FOR PHONOGRAPHS.

48,683.

Specification for Design.

Patented Mar. 7, 1916.

Application filed January 8, 1916. Serial No. 71,117. Term of patent 14 years.

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HENRY FINCH CHATFIELD.

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THE HISTORY OF THE UNITED STATES

OF THE UNITED STATES OF AMERICA

FROM THE FIRST SETTLEMENTS TO THE PRESENT TIME

BY JAMES M. SMITH

IN TWO VOLUMES

VOLUME I

NEW YORK: PUBLISHED BY J. B. LIPPINCOTT & CO.

1854

THE HISTORY OF THE UNITED STATES

DESIGN.

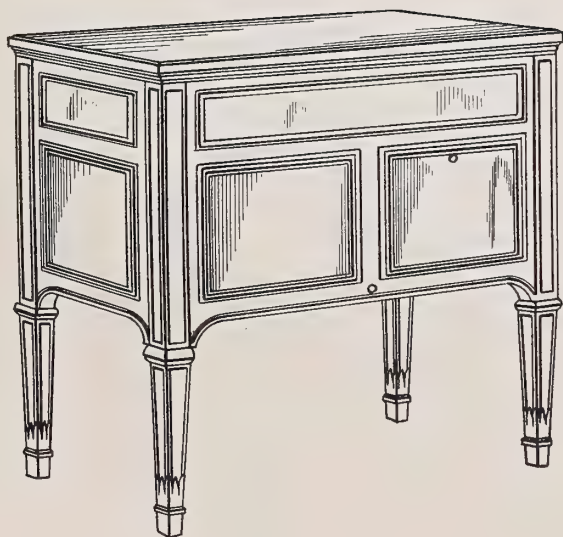
H. B. GREENE & H. F. CHATFIELD.

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Harry Bloomfield Greene
INVENTORS
And
Henry Finch Chatfield
BY
Edw. Herr Jr. ATTORNEY

UNITED STATES PATENT OFFICE.

HARRY BLOOMFIELD GREENE, OF HASBROUCK HEIGHTS, NEW JERSEY, AND HENRY FINCH CHATFIELD, OF MOUNT VERNON, NEW YORK.

DESIGN FOR A CABINET FOR PHONOGRAPHS.

48,684.

Specification for Design.

Patented Mar. 7, 1916.

Application filed January 8, 1916. Serial No. 71,118. Term of patent 14 years.

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Be it known that we, HARRY BLOOMFIELD GREENE and HENRY FINCH CHATFIELD, citizens of the United States, residing, respectively, in Hasbrouck Heights, Bergen county, State of New Jersey, and in Mount Vernon, Westchester county, State of New York, have invented a new, original, and ornamental Design for Cabinets for Phonographs, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

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The ornamental design for a cabinet for a phonograph substantially as shown.

In testimony whereof we have hereunto signed this specification.

HARRY BLOOMFIELD GREENE.
HENRY FINCH CHATFIELD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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DESIGN.

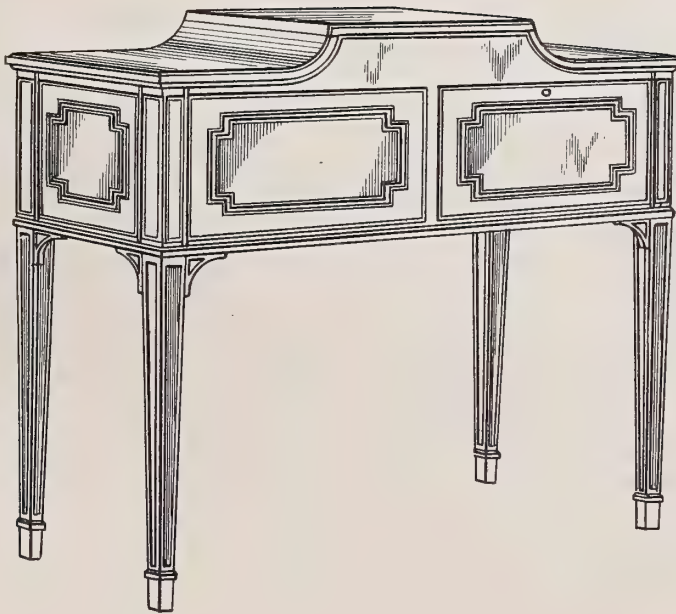
H. B. GREENE & H. F. CHATFIELD.

CABINET FOR PHONOGRAPHS.

APPLICATION FILED JAN. 8, 1916.

48,685.

Patented Mar. 7, 1916.



Harry Bloomfield Greene
INVENTORS
and
Henry Finch Chatfield
BY
E. W. Scherr ATTORNEY

UNITED STATES PATENT OFFICE.

HARRY BLOOMFIELD GREENE, OF HASBROUCK HEIGHTS, NEW JERSEY, AND HENRY FINCH CHATFIELD, OF MOUNT VERNON, NEW YORK.

DESIGN FOR A CABINET FOR PHONOGRAPHS.

48,685.

Specification for Design.

Patented Mar. 7, 1916.

Application filed January 8, 1916. Serial No. 71,119. Term of patent 14 years.

To all whom it may concern:

Be it known that we, HARRY BLOOMFIELD GREENE and HENRY FINCH CHATFIELD, citizens of the United States, residing, respectively, in Hasbrouck Heights, Bergen county, State of New Jersey, and in Mount Vernon, Westchester county, State of New York, have invented a new, original, and ornamental Design for Cabinets for Phonographs, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The figure is a perspective view of a cabinet for phonographs illustrating our new design.

We claim:

The ornamental design for a cabinet for a phonograph substantially as shown.

In testimony whereof we have hereunto signed this specification.

HARRY BLOOMFIELD GREENE.
HENRY FINCH CHATFIELD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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DESIGN.

J. HOCHHOLZER.

PHONOGRAPH CASE.

APPLICATION FILED JULY 16, 1915.

48,686.

Patented Mar. 7, 1916.

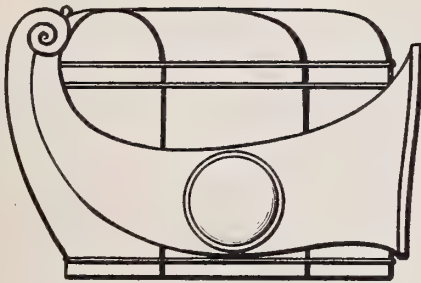


FIG. 1.

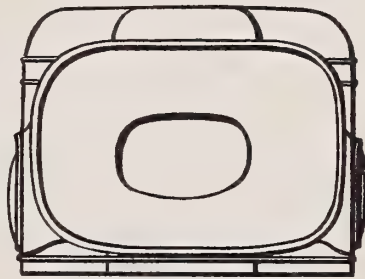


FIG. 2.

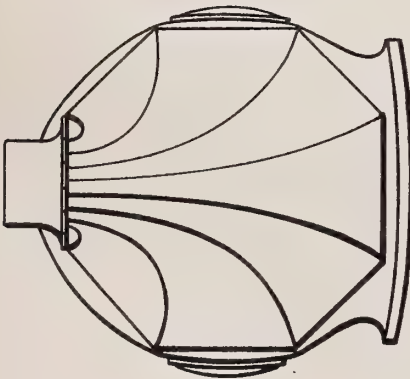


FIG. 3.

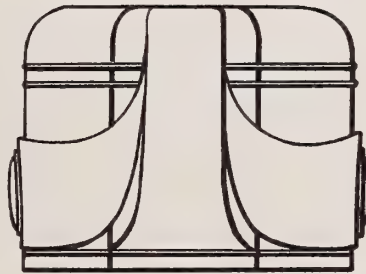


FIG. 4.

INVENTOR.
James Hochholzer,
BY
Thurmon Davis & Marvin
ATTORNEYS.

UNITED STATES PATENT OFFICE.

JAMES HOCHHOLZER, OF EAST ELMHURST, NEW YORK.

DESIGN FOR A PHONOGRAPH-CASE.

48,686.

Specification for Design.

Patented Mar. 7, 1916.

Application filed July 16, 1915. Serial No. 40,340. Term of patent $3\frac{1}{2}$ years.

To all whom it may concern:

Be it known that I, JAMES HOCHHOLZER, a citizen of the United States, residing at East Elmhurst, Long Island, in the county of Queens, State of New York, have invented a new, original, and ornamental Design for a Phonograph-Case, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

In the drawing, Figure 1 represents a side view of a phonograph case showing my new design; Figs. 2, 3 and 4, represent respectively a front elevation, a top plan view, and a rear elevation thereof.

I claim:

The ornamental design for a phonograph case, as shown.

JAMES HOCHHOLZER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

Design N° 48,938.

DESIGN.

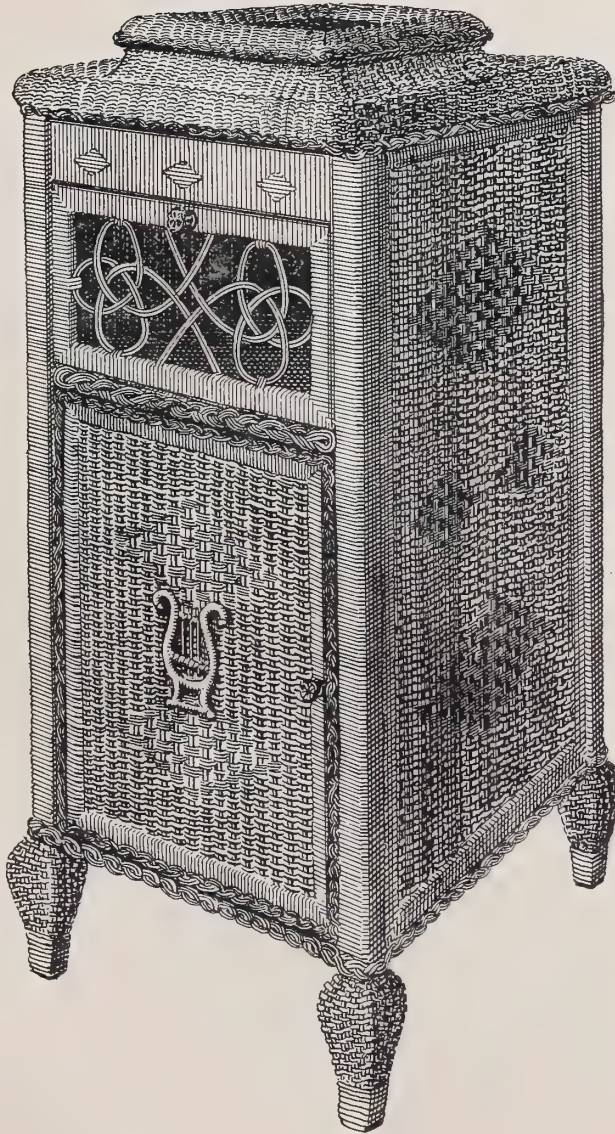
A. D. JONES.

TALKING MACHINE CABINET.

APPLICATION FILED MAR. 3, 1916.

48,938.

Patented Apr. 25, 1916.



Witnesses:
W. H. Hamble
Williecont Rogers

Inventor
Alva D. Jones

UNITED STATES PATENT OFFICE.

ALVA D. JONES, OF PHILADELPHIA, PENNSYLVANIA.

DESIGN FOR A TALKING-MACHINE CABINET.

48,938.

Specification for Design.

Patented Apr. 25, 1916.

Application filed March 3, 1916. Serial No. 82,008. Term of patent $3\frac{1}{2}$ years.

To all whom it may concern:

Be it known that I, ALVA D. JONES, a citizen of the United States, residing at 601 Witherspoon Building, Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new, original, and ornamental Design for a Talking-Machine Cabinet, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The figure is a perspective view of a talking machine cabinet showing my new design.

I claim:

The ornamental design for a talking machine cabinet as shown.

ALVA D. JONES.

Witnesses:

MILLICENT ROGERS,
VERNON STANTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

UNITED STATES PATENT OFFICE

OFFICE OF THE COMMISSIONER OF PATENTS

WASHINGTON, D. C.

NAME OF INVENTOR	RESIDENCE
NAME OF ATTORNEY	RESIDENCE
TITLE OF INVENTION	
STATE OF	COUNTY OF
DATE OF FILING	DATE OF EXAMINATION
DATE OF PATENT	DATE OF EXPIRATION
NAME OF INVENTOR	RESIDENCE
NAME OF ATTORNEY	RESIDENCE
TITLE OF INVENTION	
STATE OF	COUNTY OF
DATE OF FILING	DATE OF EXAMINATION
DATE OF PATENT	DATE OF EXPIRATION

DESIGN.

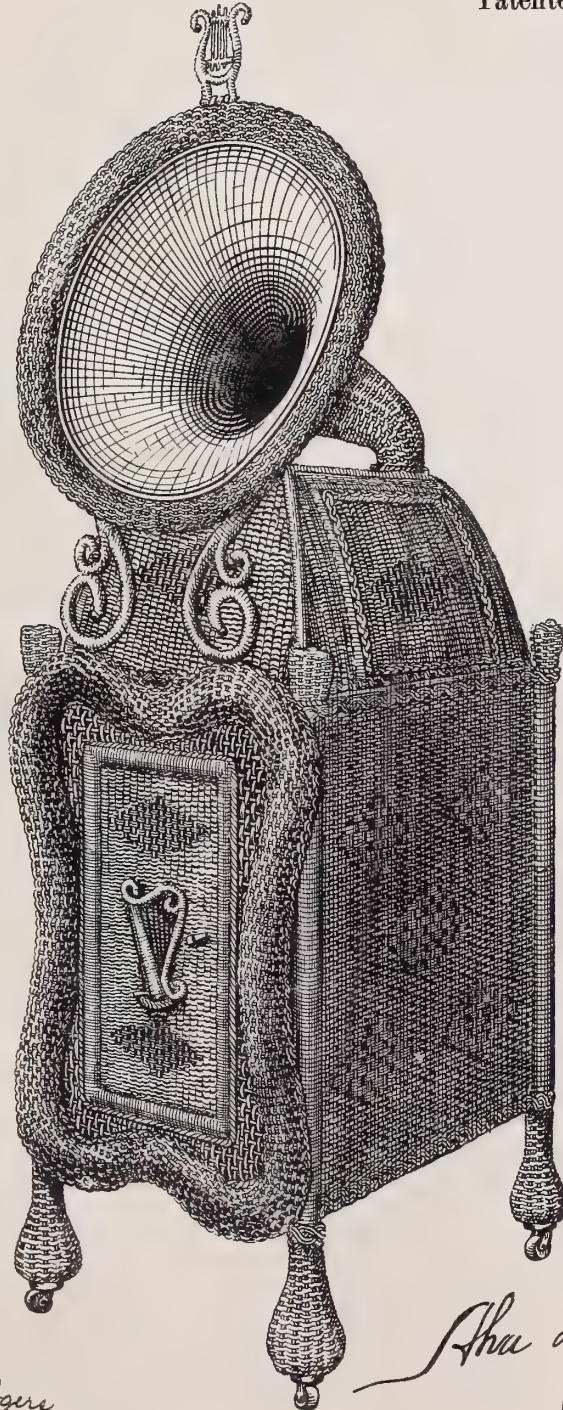
A. D. JONES.

CABINET FOR TALKING MACHINES.

APPLICATION FILED FEB. 16, 1916.

48,975.

Patented May 2, 1916.



Witnesses
W. H. Edwards
Millicent Rogers

Inventor

A. D. Jones

UNITED STATES PATENT OFFICE.

ALVA D. JONES, OF PHILADELPHIA, PENNSYLVANIA.

DESIGN FOR A CABINET FOR TALKING-MACHINES.

48,975.

Specification for Design.

Patented May 2, 1916.

Application filed February 16, 1916. Serial No. 78,774. Term of patent $3\frac{1}{2}$ years.

To all whom it may concern:

Be it known that I, ALVA D. JONES, a citizen of the United States, and a resident of the city of Philadelphia, county of Philadelphia, State of Pennsylvania, (whose post-office address is 601 Witherspoon Building,) have invented a new, original, and ornamental Design for Cabinets for Talking-Machines, of which the following is a specification, reference being had to the accompanying drawing, forming a part hereof.

The figure is a perspective view of a cabinet for a talking machine showing my new design.

I claim:—

The ornamental design for a cabinet for a talking machine as shown.

ALVA D. JONES.

Witnesses:

VERNON STANTON,
MILLCENT ROGERS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

UNITED STATES DEPARTMENT OF AGRICULTURE

OFFICE OF THE SECRETARY, WASHINGTON, D. C.

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SUBJECT: [Illegible]

Very respectfully,
[Illegible Signature]

DESIGN.

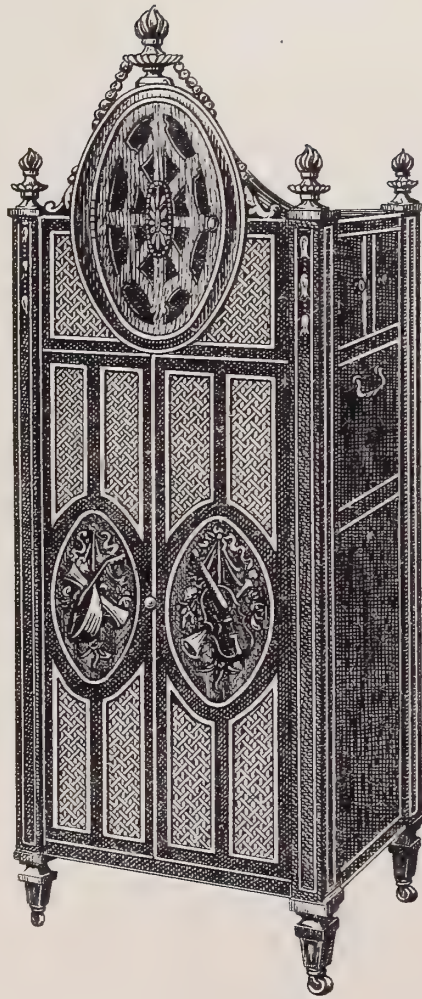
A. D. JONES.

CABINET FOR TALKING MACHINES.

APPLICATION FILED FEB. 16, 1916.

48,976.

Patented May 2, 1916.



Inventor

Witnesses

W. H. Hamble
Millicent Rogers.

Tha D. Jones

UNITED STATES PATENT OFFICE.

ALVA D. JONES, OF PHILADELPHIA, PENNSYLVANIA.

DESIGN FOR A CABINET FOR TALKING-MACHINES.

48,976.

Specification for Design.

Patented May 2, 1916.

Application filed February 16, 1916. Serial No. 78,775. Term of patent 3½ years.

To all whom it may concern:

Be it known that I, ALVA D. JONES, a citizen of the United States, and a resident of the city of Philadelphia, county of Philadelphia, State of Pennsylvania (whose post-office address is 601 Witherspoon Building,) have invented a new, original, and ornamental Design for Cabinets for Talking-Machines, of which the following is a specification, reference being had to the accompanying drawing, forming a part hereof.

The figure is a perspective view of a cabinet for a talking machine showing my new design.

I claim:—

The ornamental design for a cabinet for a talking machine as shown.

ALVA D. JONES.

Witnesses:

VERNON STANTON,
MILLCENT ROGERS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

MEMORANDUM FOR THE RECORD

DATE: 10/10/54

TO: Mr. Tolson

FROM: Mr. Clegg

SUBJECT: [Illegible]

RE: [Illegible]

[Illegible]

[Illegible]

[Illegible]

[Illegible]

[Illegible]

[Illegible]

[Illegible]

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[Illegible]

[Illegible]

[Illegible]

DESIGN.

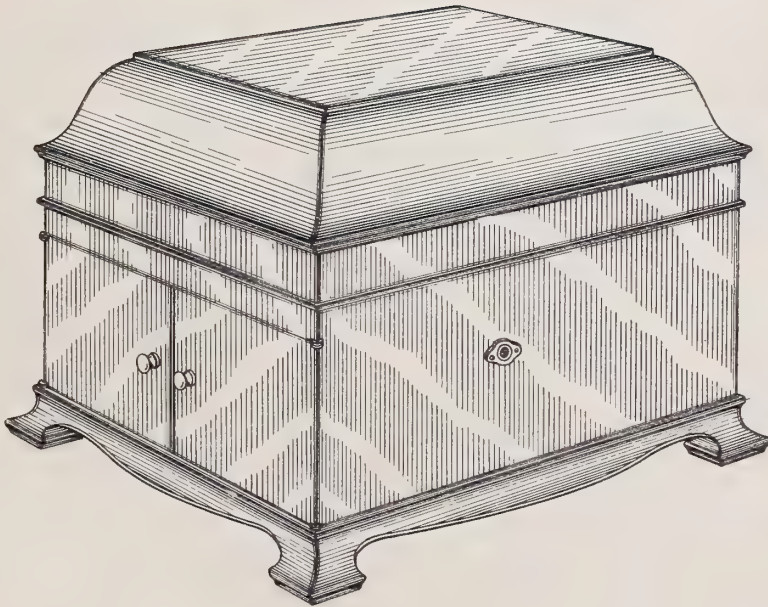
E. T. KIEFFER.

CABINET FOR TALKING MACHINES.

APPLICATION FILED FEB. 11, 1915.

49,215.

Patented June 20, 1916.



INVENTOR

Eugene T. Kieffer

WITNESSES

H. J. Hartman

Eugene N. Helber

BY

Hutton + Blount

ATTORNEYS

UNITED STATES PATENT OFFICE.

EUGENE T. KIEFFER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

DESIGN FOR A CABINET FOR TALKING-MACHINES.

49,215.

Specification for Design.

Patented June 20, 1916.

Application filed February 11, 1915. Serial No. 7,603. Term of patent 14 years.

To all whom it may concern:

Be it known that I, EUGENE T. KIEFFER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new, original, and ornamental Design for Cabinets for Talking-Machines, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

The figure is a perspective view of a cabinet for a talking machine showing my new design.

I claim:

The ornamental design for a cabinet for a talking machine, as shown.

EUGENE T. KIEFFER.

Witnesses:

MARGUERITTE McFALLS,
CHARLES F. WILLARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DESIGN.

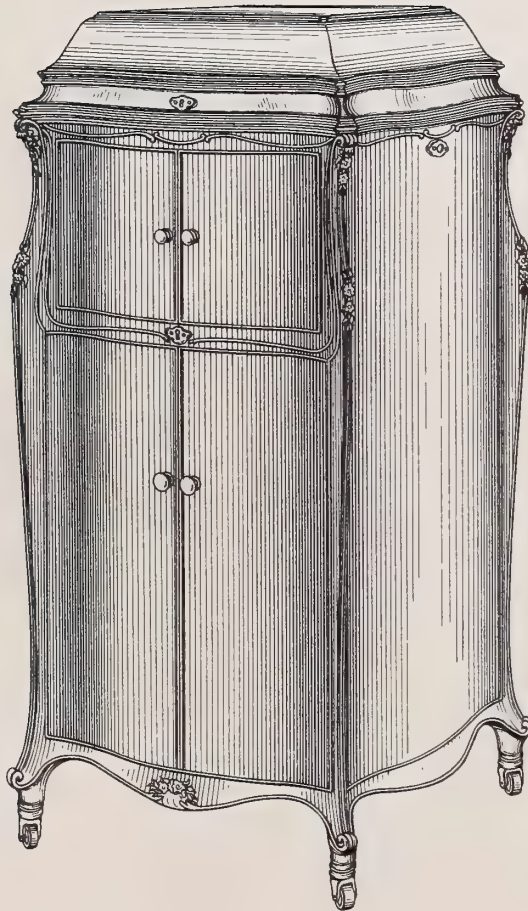
E. T. KIEFFER.

CABINET FOR TALKING MACHINES.

APPLICATION FILED APR. 24, 1916.

49,216.

Patented June 20, 1916.



WITNESS

F. J. Hartman.

BY

INVENTOR

Eugene T. Kieffer.

Frutkin & Blount.

ATTORNEYS

UNITED STATES PATENT OFFICE.

EUGENE T. KIEFFER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

DESIGN FOR A CABINET FOR TALKING-MACHINES.

49,216.

Specification for Design.

Patented June 20, 1916.

Application filed April 24, 1916. Serial No. 93,333. Term of patent 14 years.

To all whom it may concern:

Be it known that I, EUGENE T. KIEFFER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new, original, and ornamental Design for Cabinets for Talking-Machines, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

The figure is a perspective view of a cabinet for a talking machine showing my new design.

I claim:

The ornamental design for a cabinet for a talking machine, as shown.

EUGENE T. KIEFFER.

Witnesses:

GEORGE K. HELBERT,
ALEXANDER PARK.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DESIGN.

E. J. FISCHER.

TALKING MACHINE CABINET.

APPLICATION FILED APR. 14, 1916.

49,300.

Patented July 4, 1916.

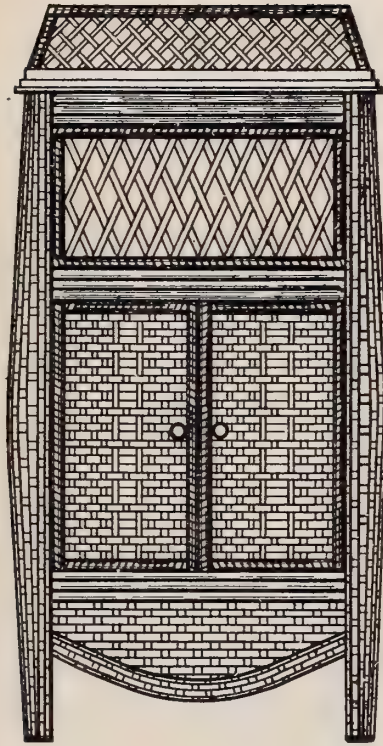


Fig 1

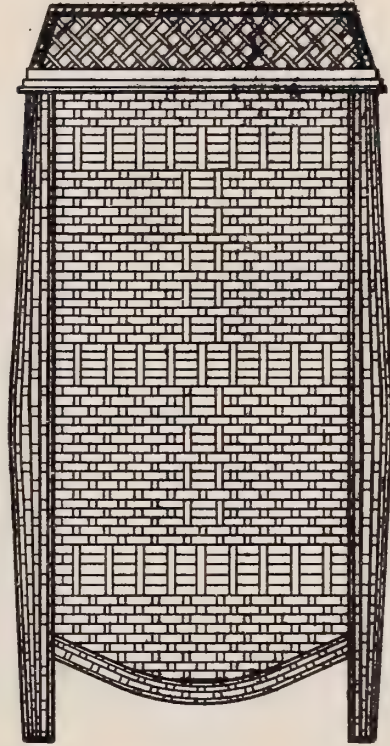


Fig 2

Witnesses
Matter C. Stuebing
Law & Co.

Inventor
Edward J. Fischer
By John W. Strehli
Attorney

UNITED STATES PATENT OFFICE.

EDWARD J. FISCHER, OF CINCINNATI, OHIO.

DESIGN FOR A TALKING-MACHINE CABINET.

49,300.

Specification for Design.

Patented July 4, 1916.

Application filed April 14, 1916. Serial No. 91,257. Term of patent $3\frac{1}{2}$ years.

To all whom it may concern:

Be it known that I, EDWARD J. FISCHER, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented a new, original, and ornamental Design for a Talking-Machine Cabinet, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

Figure 1 is a front view of a talking machine cabinet illustrating my new design, and Fig. 2, is a side view thereof.

I claim:

The ornamental design for a talking machine cabinet, as shown.

Witness my hand at the city of Cincinnati, in the county of Hamilton, and State of Ohio, this 10th day of April, 1916.

EDWARD J. FISCHER.

Witnesses:

ALBERT W. ALDEMEYER,
H. E. CARSTENS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DESIGN.

P. A. HORSWELL.

CABINET FOR TALKING MACHINES.

APPLICATION FILED MAR. 15, 1916.

49,519.

Patented Aug. 15, 1916.

Fig. 3.

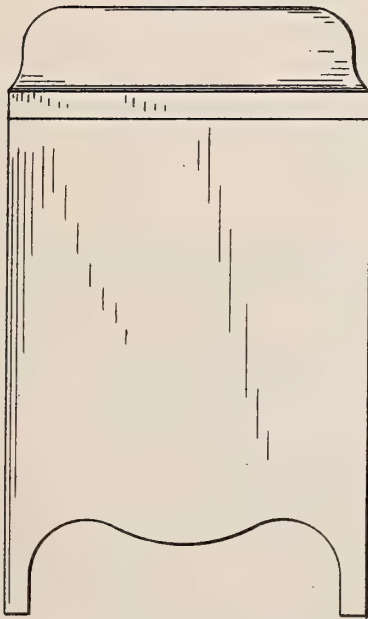


Fig. 2.

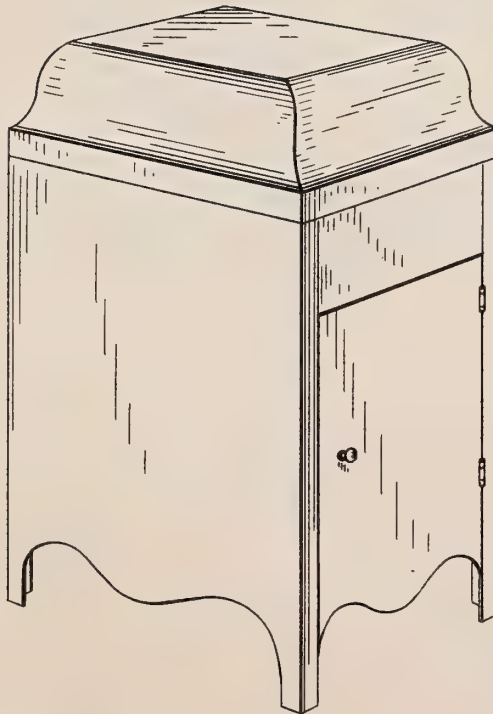
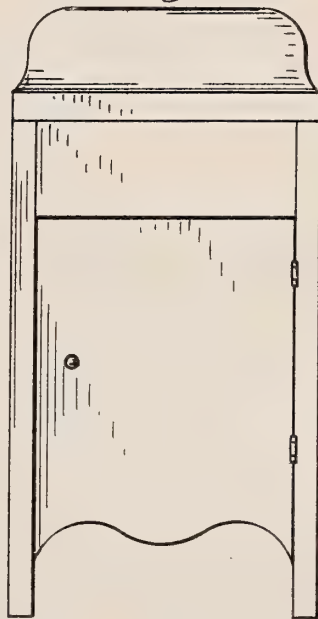


Fig. 1.

Inventor
Percy A. Horswell
by Thurston & Kwie
Attys

UNITED STATES PATENT OFFICE.

PERCY A. HORSWELL, OF CLEVELAND, OHIO, ASSIGNOR TO THE CAROLA COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

DESIGN FOR A CABINET FOR TALKING-MACHINES.

49,519.

Specification for Design.

Patented Aug. 15, 1916.

Application filed March 15, 1916. Serial No. 84,499. Term of patent 7 years.

To all whom it may concern:

Be it known that I, PERCY A. HORSWELL, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new, original, and ornamental Design for a Cabinet for Talking-Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

In said drawings, Figure 1 is a perspec-

tive view of a cabinet for talking machines; Fig. 2 is a front view; and Fig. 3 is a side view, all figures showing my new design.

I claim:

The ornamental design for a cabinet for talking machines, substantially as shown.

PERCY A. HORSWELL.

Witnesses:

L. I. PORTER,

A. J. HUDSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DESIGN.

F. A. ROSS.

PHONOGRAPH BODY.

APPLICATION FILED JUNE 8, 1916.

49,524.

Patented Aug. 15, 1916.

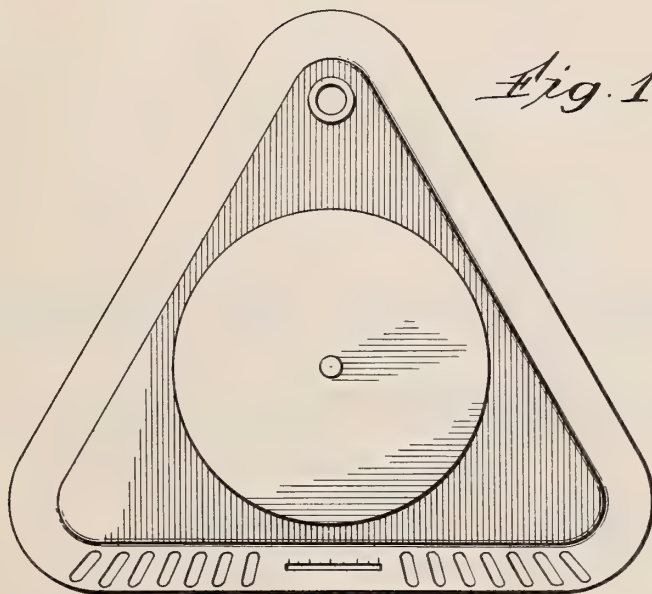


Fig. 1.

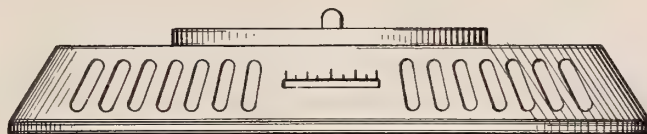


Fig. 2.

Witness
Chas. Glumet

Inventor:
Frank A. Ross,
by *Burton Burton*
his Atty's:

UNITED STATES PATENT OFFICE.

FRANK A. ROSS, OF WILMETTE, ILLINOIS, ASSIGNOR TO STEWART PHONOGRAPH CORPORATION, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

DESIGN FOR A PHONOGRAPH-BODY.

49,524.

Specification for Design.

Patented Aug. 15, 1916.

Application filed June 8, 1916. Serial No. 102,595. Term of patent $3\frac{1}{2}$ years.

To all whom it may concern:

Be it known that I, FRANK A. ROSS, a citizen of the United States, residing at Wilmette, in the county of Cook and State of Illinois, have invented a new, original, and ornamental Design for a Phonograph-Body, of which the following is a specification, reference being had to the accompanying drawings forming a part thereof.

In the drawings:—Figure 1 is a top plan view of the phonograph body embodying this invention. Fig. 2 is a side elevation of

the phonograph body embodying this invention.

I claim:—

The ornamental design for a phonograph body, as shown.

In testimony whereof I have hereunto set my hand at Chicago, Illinois, this 6th day of June, 1916.

FRANK A. ROSS.

Witnesses:

EDNA M. MACINTOSH,
LUCY I. STONE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."

DESIGN.

F. A. ROSS.

PHONOGRAPH BODY.

APPLICATION FILED JUNE 8, 1916.

49,525.

Patented Aug. 15, 1916.

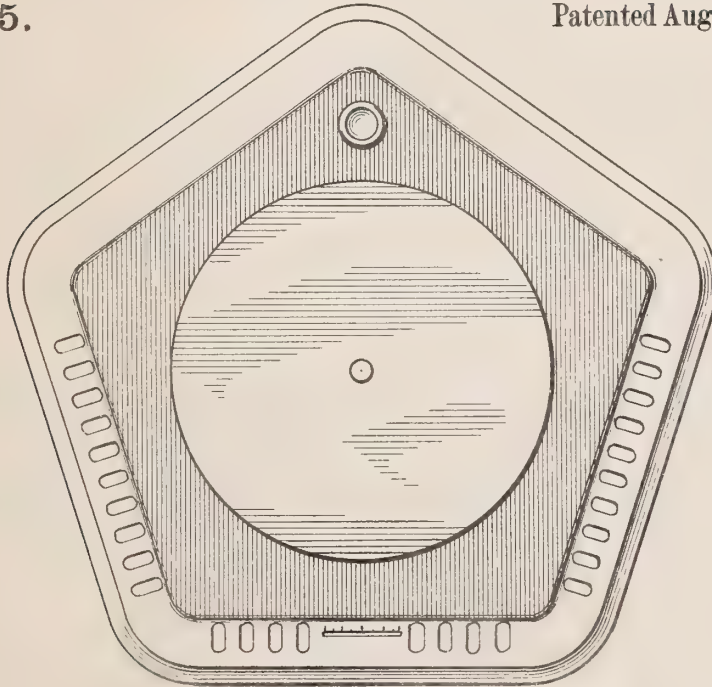


Fig. 1.

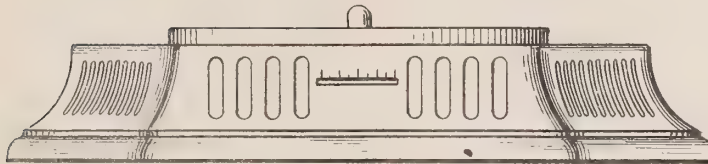


Fig. 2.

Witness
Chas. H. Smith

Inventor:
Frank A. Ross,
by *Burton H. Burton*

his Atty:

UNITED STATES PATENT OFFICE.

FRANK A. ROSS, OF WILMETTE, ILLINOIS, ASSIGNOR TO STEWART PHONOGRAPH CORPORATION, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

DESIGN FOR A PHONOGRAPH-BODY.

49,525.

Specification for Design.

Patented Aug. 15, 1916.

Application filed June 8, 1916. Serial No. 102,596. Term of patent $3\frac{1}{2}$ years.

To all whom it may concern:

Be it known that I, FRANK A. ROSS, a citizen of the United States, residing at Wilmette, in the county of Cook and State of Illinois, have invented a new, original, and ornamental Design for a Phonograph-Body, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

In the drawings:—Figure 1 is a top plan view of the phonograph body embodying this invention. Fig. 2 is a side elevation of

the phonograph body embodying this invention.

I claim:—

The ornamental design for a phonograph body, as shown.

In testimony whereof I have hereunto set my hand at Chicago, Illinois, this 6th day of June, 1916.

FRANK A. ROSS.

Witnesses:

LUCY I. STONE,

EDNA M. MACINTOSH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DESIGN.

F. A. ROSS.

PHONOGRAPH BODY.

APPLICATION FILED JUNE 8, 1916.

49,526.

Patented Aug. 15, 1916.

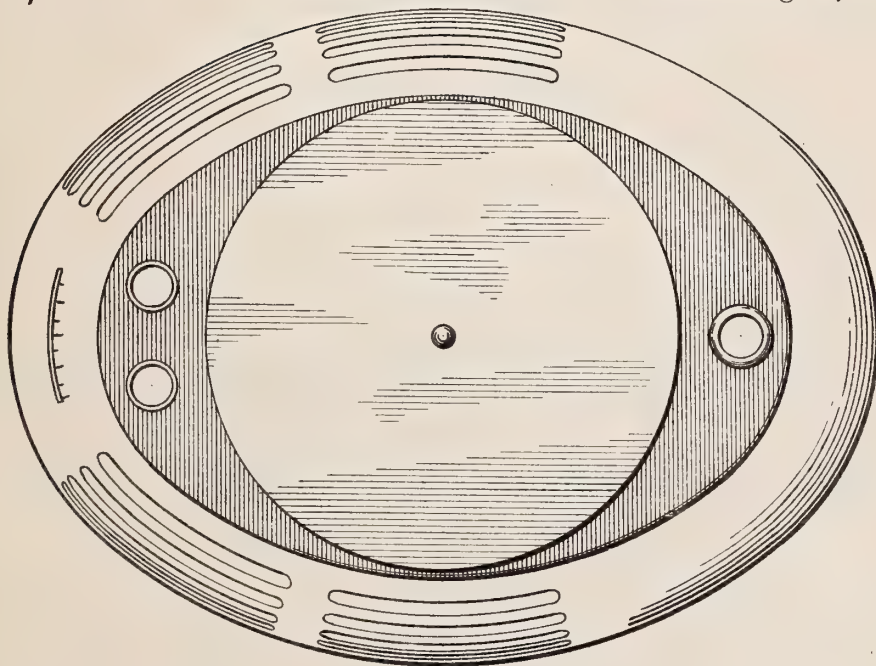


Fig. 1.

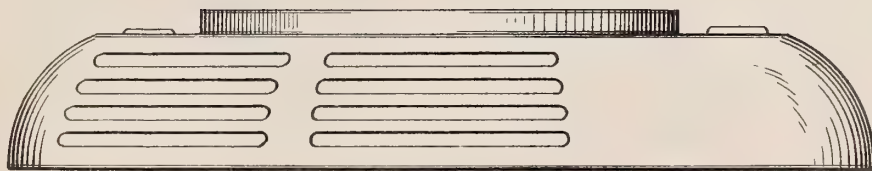


Fig. 2.

Witness
Chas. E. Luntz

Inventor:
Frank A. Ross,
by *Burton Burton*
his Atty.

UNITED STATES PATENT OFFICE.

FRANK A. ROSS, OF WILMETTE, ILLINOIS, ASSIGNOR TO STEWART PHONOGRAPH CORPORATION, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

DESIGN FOR A PHONOGRAPH-BODY.

49,526.

Specification for Design.

Patented Aug. 15, 1916.

Application filed June 8, 1916. Serial No. 102,597. Term of patent $3\frac{1}{2}$ years.

To all whom it may concern:

Be it known that I, FRANK A. ROSS, a citizen of the United States, residing at Wilmette, in the county of Cook and State of Illinois, have invented a new, original, and ornamental Design for a Phonograph-Body, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

In the drawings:—Figure 1 is a top plan view of the phonograph body embodying this invention. Fig. 2 is a side elevation of

the phonograph body embodying this invention.

I claim:—

The ornamental design for a phonograph body, as shown.

In testimony whereof I have hereunto set my hand at Chicago, Illinois, this 6th day of June, 1916.

FRANK A. ROSS.

Witnesses:

EDNA M. MACINTOSH,
LUCY I. STONE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DESIGN.

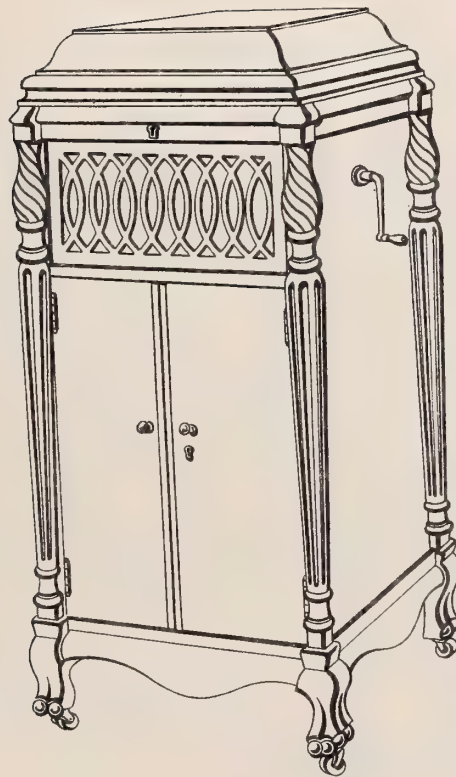
W. D. CALDWELL.

PHONOGRAPH OR TALKING MACHINE CABINET.

APPLICATION FILED JUNE 30, 1916.

Patented Aug. 29, 1916.

49,570.



INVENTOR

W. D. Caldwell.

BY

Fred G. Dutcher & Co.
ATTORNEYS

UNITED STATES PATENT OFFICE.

WALTER D. CALDWELL, OF OKLAHOMA, OKLAHOMA, ASSIGNOR TO PLAYERPHONE
TALKING MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF
OKLAHOMA.

DESIGN FOR A PHONOGRAPH OR TALKING-MACHINE CABINET.

49,570.

Specification for Design.

Patented Aug. 29, 1916.

Application filed June 30, 1916. Serial No. 106,977. Term of patent 7 years.

To all whom it may concern:

Be it known that I, WALTER D. CALDWELL, a citizen of the United States, residing at Oklahoma city, in the county of Oklahoma and State of Oklahoma, have invented a new, original, and ornamental Design for Phonograph or Talking-Machine Cabinets, of which the following is a specification, reference being had to the accompanying draw-

ing, forming a part thereof, in which the figure is a perspective view of a phonograph or talking-machine cabinet, showing my new design.

What I claim is:

The ornamental design for a phonograph or talking machine cabinet, substantially as shown.

WALTER D. CALDWELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DESIGN.

W. D. CALDWELL.

PHONOGRAPH OR TALKING MACHINE CABINET.

APPLICATION FILED JUNE 30, 1916.

49,571.

Patented Aug. 29, 1916.



INVENTOR

W.D. Caldwell.

BY

Fred G. Deterick & Co.
ATTORNEYS

UNITED STATES PATENT OFFICE.

WALTER D. CALDWELL, OF OKLAHOMA, OKLAHOMA, ASSIGNOR TO PLAYERPHONE TALKING MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF OKLAHOMA.

DESIGN FOR A PHONOGRAPH OR TALKING-MACHINE CABINET.

49,571.

Specification for Design.

Patented Aug. 29, 1916.

Application filed June 30, 1916. Serial No. 106,978. Term of patent 7 years.

To all whom it may concern:

Be it known that I, WALTER D. CALDWELL, a citizen of the United States, residing at Oklahoma city, in the county of Oklahoma and State of Oklahoma, have invented a new, original, and ornamental Design for Phonograph or Talking-Machine Cabinets, of which the following is a specification, reference being had to the accompanying

drawing, forming a part thereof, in which the figure is a perspective view of a phonograph or talking-machine cabinet showing my new design.

What I claim is:

The ornamental design for a phonograph or talking machine cabinet, substantially as shown.

WALTER D. CALDWELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DESIGN.

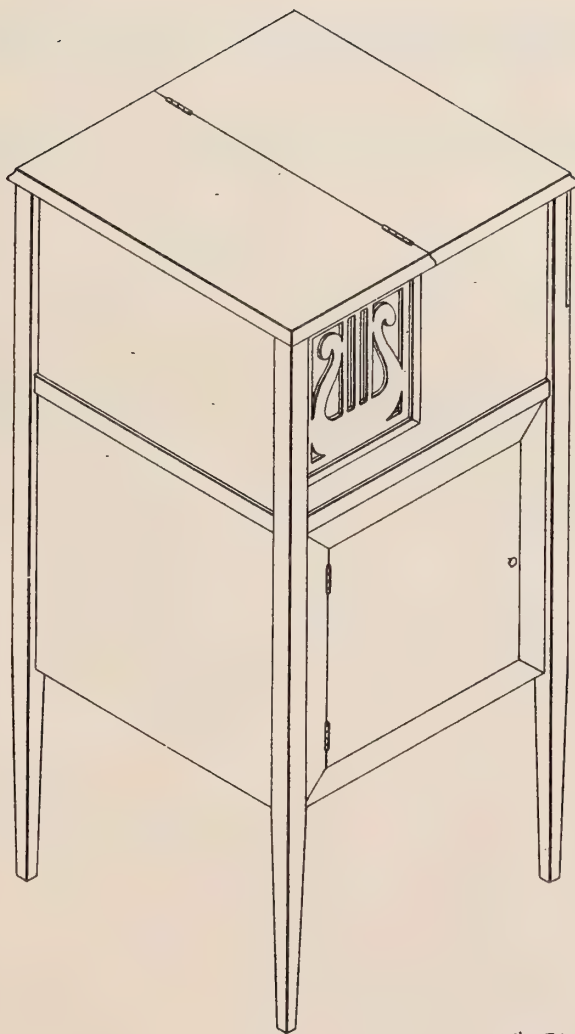
H. SHEBLE.

TALKING MACHINE CABINET.

APPLICATION FILED JUNE 15, 1916.

49,592.

Patented Aug. 29, 1916.



INVENTOR
HORACE SHEBLE
BY HIS ATTORNEY
Harry Smith

UNITED STATES PATENT OFFICE.

HORACE SHEBLE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO DOMESTIC TALKING MACHINE CORPORATION, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

DESIGN FOR A TALKING-MACHINE CABINET.

49,592.

Specification for Design.

Patented Aug. 29, 1916.

Application filed June 15, 1916. Serial No. 103,892. Term of patent 7 years.

To all whom it may concern:

Be it known that I, HORACE SHEBLE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented a new, original, and ornamental Design for Talking-Machine Cabinets, of which the following is a specification.

My design is fully shown in the accompanying drawing which represents a perspective view of a cabinet embodying the design.

I claim:

The ornamental design for a talking machine cabinet as shown.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses.

HORACE SHEBLE.

Witnesses:

KATE A. BEADLE,
HAMILTON D. TURNER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

UNITED STATES PATENT OFFICE.

HORACE SHEBLE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO DOMESTIC TALKING MACHINE CORPORATION, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

DESIGN FOR A TALKING-MACHINE CABINET.

49,592.

Specification for Design.

Patented Aug. 29, 1916.

Application filed June 15, 1916. Serial No. 103,892. Term of patent 7 years.

To all whom it may concern:

Be it known that I, HORACE SHEBLE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented a new, original, and ornamental Design for Talking-Machine Cabinets, of which the following is a specification.

My design is fully shown in the accompanying drawing which represents a perspective view of a cabinet embodying the design.

I claim:

The ornamental design for a talking machine cabinet as shown.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses.

HORACE SHEBLE.

Witnesses:

KATE A. BEADLE,
HAMILTON D. TURNER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DESIGN.

J. K. STEWART.

PHONOGRAPH BODY.

APPLICATION FILED JAN. 5, 1916.

49,629.

Patented Sept. 5, 1916.

Fig. 1.

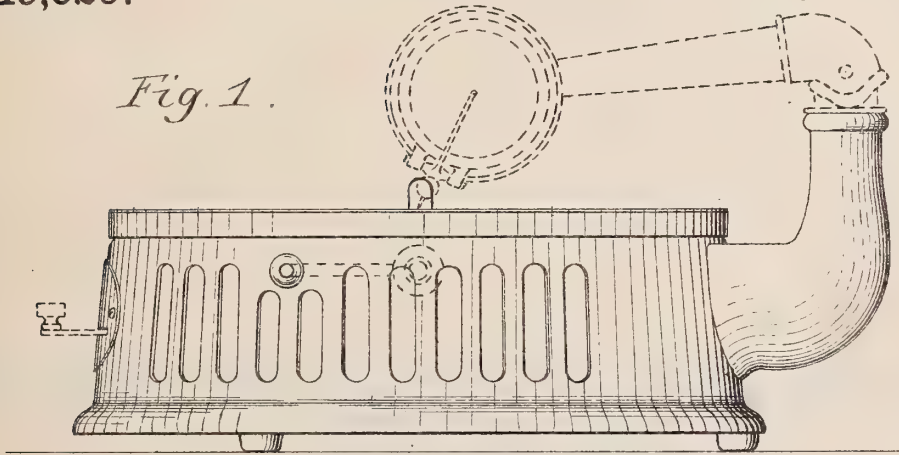
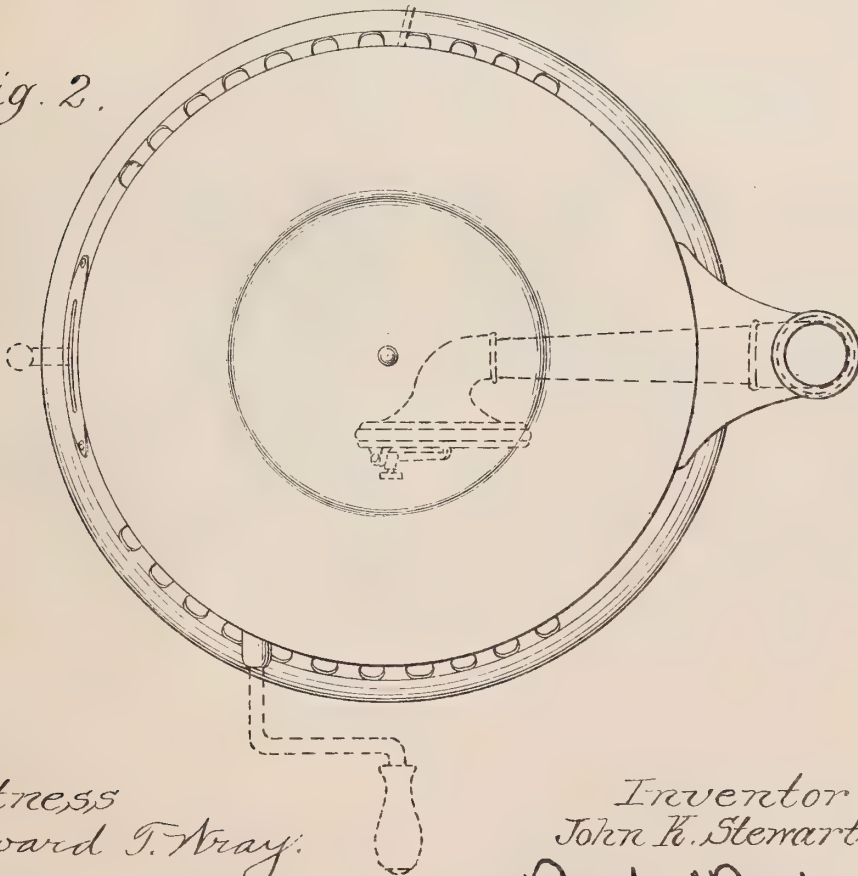


Fig. 2.



Witness
Edward T. Wray.

Inventor.
John K. Stewart.
by *Burton Burton*
his Attorneys.

UNITED STATES PATENT OFFICE.

JOHN K. STEWART, OF CHICAGO, ILLINOIS.

DESIGN FOR A PHONOGRAPH-BODY.

49,629.

Specification for Design.

Patented Sept. 5, 1916.

Application filed January 5, 1916. Serial No. 70,544. Term of patent 14 years.

To all whom it may concern:

Be it known that I, JOHN K. STEWART, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new, original, and ornamental Design for a Phonograph-Body, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

In the drawings:—Figure 1 is a side elevation of a phonograph body embodying my new design with certain parts shown in dotted lines. Fig. 2 is a top plan view of

the phonograph body illustrated in Fig. 1 with the same certain parts shown in dotted lines.

I claim:—

The ornamental design for a phonograph body, as shown.

In testimony whereof I have hereunto set my hand at New York city N. Y., this 3d day of January, 1916.

JOHN K. STEWART.

Witness:

CHAS. S. BURTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



DESIGN.

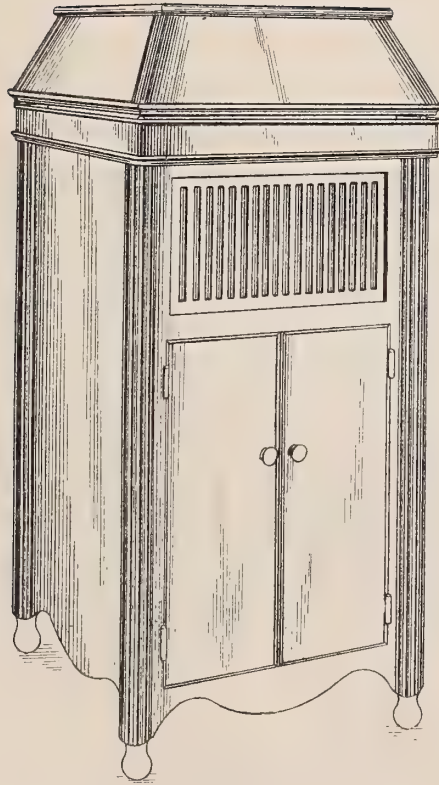
D. W. GIST.

PHONOGRAPH OR TALKING MACHINE CABINET.

APPLICATION FILED MAY 3, 1916.

49,606.

Patented Sept. 5, 1916.



WITNESSES:

Wm. H. Thompson
W. C. John

INVENTOR,

D. W. Gist.

BY

George H. Thompson

ATTORNEY

UNITED STATES PATENT OFFICE.

DENNIE W. GIST, OF KANSAS CITY, MISSOURI.

DESIGN FOR A PHONOGRAPH OR TALKING-MACHINE CABINET.

49,606.

Specification for Design.

Patented Sept. 5, 1916.

Application filed May 3, 1916. Serial No. 95,733. Term of patent $3\frac{1}{2}$ years.

To all whom it may concern:

Be it known that I, DENNIE W. GIST, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented a new, original, and ornamental Design for a Phonograph or Talking-Machine Cabinet, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The figure is a perspective view of a pho-

nograph or talking machine cabinet, showing my new design.

I claim:

The ornamental design for a phonograph or talking machine cabinet, as shown.

In witness whereof, I have affixed my signature in the presence of two witnesses.

DENNIE W. GIST.

Witnesses:

K. M. THORPE,
H. C. RODGERS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DESIGN.

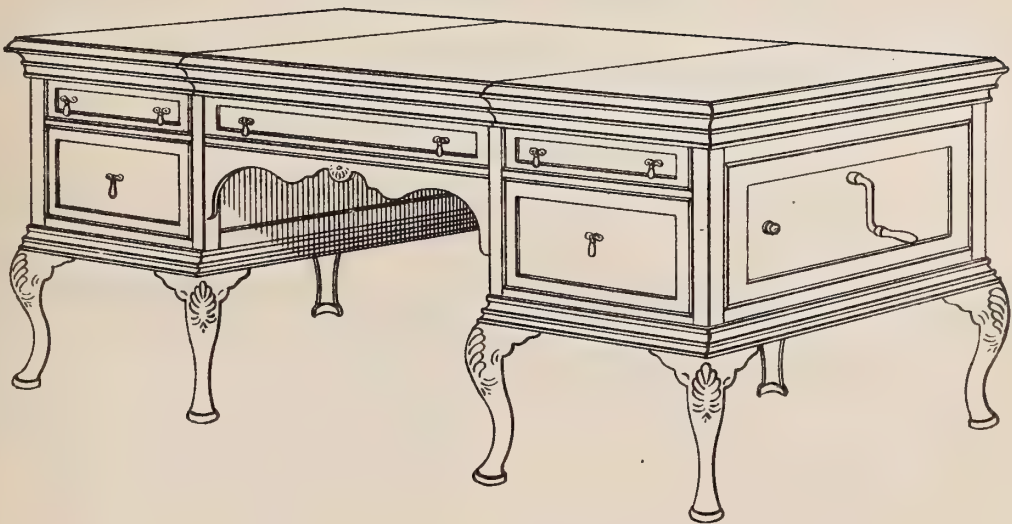
H. C. MOYER.

PHONOGRAPH CABINET.

APPLICATION FILED JUNE 12, 1916.

49,654.

Patented Sept. 12, 1916.



Witness:
John Enders

Inventor:
Horace C. Moyer
by Fred Gerlach
his Atty.

UNITED STATES PATENT OFFICE.

HORACE C. MOYER, OF OAK PARK, ILLINOIS, ASSIGNOR TO THE WINDSOR FURNITURE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

DESIGN FOR A PHONOGRAPH-CABINET.

49,654.

Specification for Design.

Patented Sept. 12, 1916.

Application filed June 12, 1916. Serial No. 103,327. Term of patent 14 years.

To all whom it may concern:

Be it known that I, HORACE C. MOYER, a citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented a new, original, and ornamental Design for Phonograph-Cabinets, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

In the drawing: the figure is a perspective of a phonograph cabinet showing my new design.

I claim:

The ornamental design for a phonograph cabinet as shown.

HORACE C. MOYER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

THE HISTORY OF THE UNITED STATES

OF THE UNITED STATES OF AMERICA
FROM THE FIRST SETTLEMENTS TO THE PRESENT TIME
BY
JAMES M. SMITH
VOLUME I
THE EARLY PERIOD
FROM 1607 TO 1763
NEW YORK
PUBLISHED BY
JOHN WILEY & SONS
15 N. ASSATEZ ST. N. Y. C.

DESIGN.

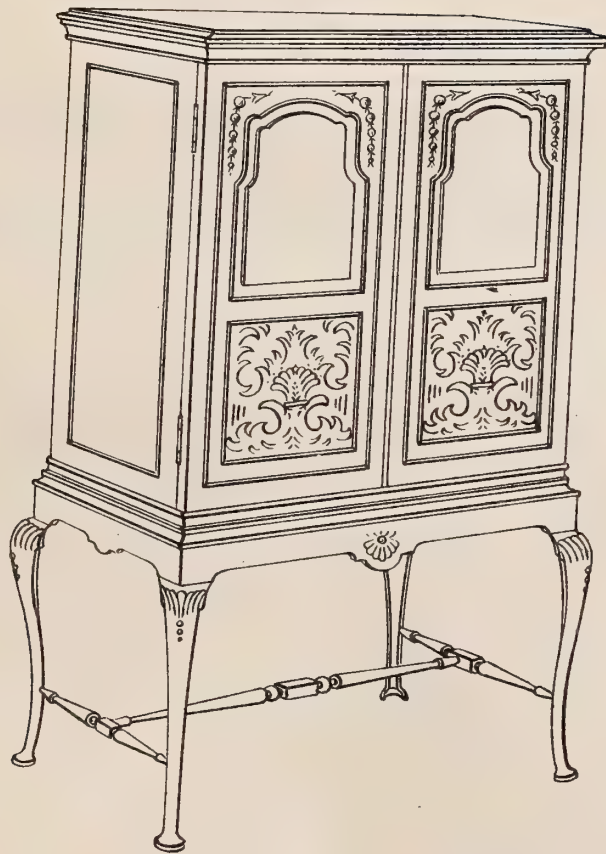
H. C. MOYER.

PHONOGRAPH CABINET.

APPLICATION FILED JUNE 12, 1916.

49,655.

Patented Sept. 12, 1916.



Witness:

John Enders

Inventor:

Horace C. Moyer
by Fred Gerlach

his Atty.

UNITED STATES PATENT OFFICE.

HORACE C. MOYER, OF OAK PARK, ILLINOIS, ASSIGNOR TO THE WINDSOR FURNITURE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

DESIGN FOR A PHONOGRAPH-CABINET.

49,655.

Specification for Design.

Patented Sept. 12, 1916.

Application filed June 12, 1916. Serial No. 103,328. Term of patent 14 years.

To all whom it may concern:

Be it known that I, HORACE C. MOYER, a citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented a new, original, and ornamental Design for Phonograph-Cabinets, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

In the drawing: the figure is a perspective of a phonograph cabinet showing my new design.

I claim:—

The ornamental design for a phonograph cabinet as shown.

HORACE C. MOYER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

DESIGN.

O. HEINEMAN.

TALKING MACHINE CABINET.

APPLICATION FILED DEC. 20, 1915.

49,739.

Patented Oct. 10, 1916.

Fig. 1

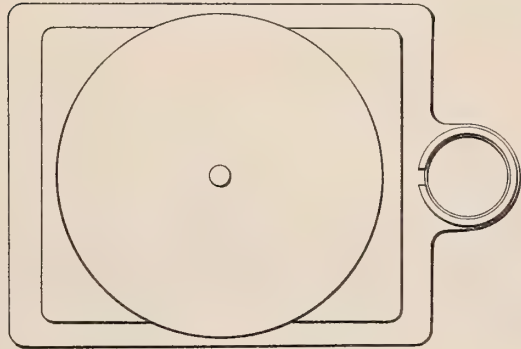


Fig. 3

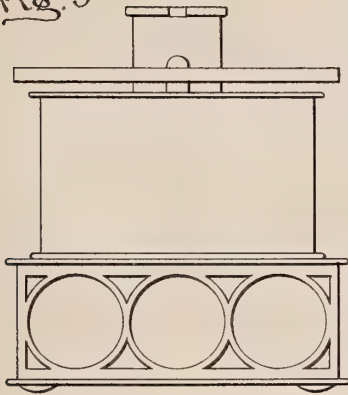
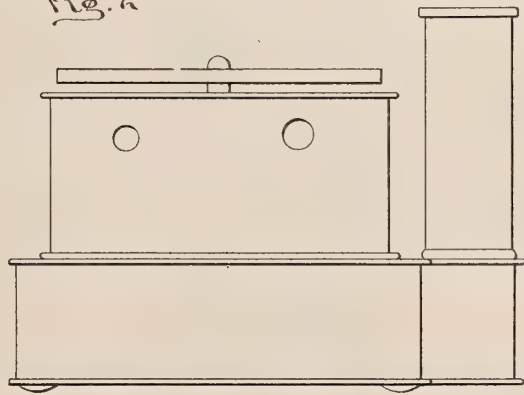


Fig. 2



Witnesses:

M. H. Lewis
Samuel Lopal.

Inventor

Otto Heinemann
by John L. Latsch
his

Attorney.



UNITED STATES PATENT OFFICE.

OTTO HEINEMAN, OF NEW YORK, N. Y., ASSIGNOR TO OTTO HEINEMAN PHONOGRAPH SUPPLY CO., INC., A CORPORATION OF NEW YORK.

DESIGN FOR A TALKING-MACHINE CABINET.

49,739.

Specification for Design.

Patented Oct. 10, 1916.

Application filed December 20, 1915. Serial No. 67,916. Term of patent 7 years.

To all whom it may concern:

Be it known that I, OTTO HEINEMAN, a subject of the Emperor of Germany, residing in the borough of Manhattan, city, county, and State of New York, have invented a new, original, and ornamental Design for a Talking-Machine Cabinet, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

Figure 1 is a plan view of a talking machine showing my new design; Fig. 2 is a

side elevation of the same, and Fig. 3 is a front elevation of the same.

What I claim is:

The ornamental design for a talking-machine cabinet, as shown.

This specification signed and witnessed this 1st day of December, 1915.

OTTO HEINEMAN.

Witnesses:

JACOB SCHECHTER,
JOHN L. LOTSCH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

THE HISTORY OF THE UNITED STATES

OF THE UNITED STATES OF AMERICA
FROM THE FIRST SETTLEMENTS TO THE PRESENT TIME
BY JAMES M. SMITH

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OF AMERICA
FROM THE FIRST SETTLEMENTS
TO THE PRESENT TIME
BY JAMES M. SMITH

DESIGN.

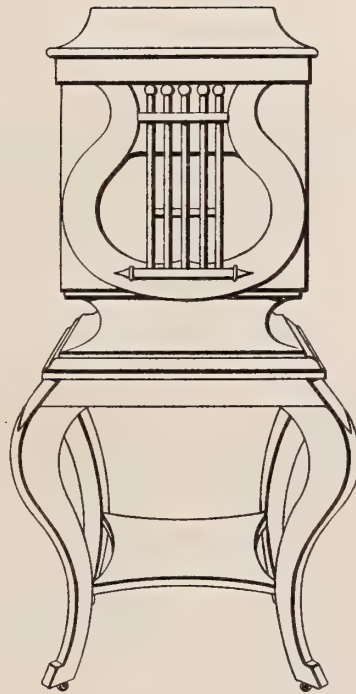
J. VIRZI.

CABINET.

APPLICATION FILED AUG. 1, 1916.

49,912.

Patented Nov. 14, 1916.



WITNESSES

L. Haverstein
E. B. Marshall

INVENTOR

John Virzi
BY *Mumford*
ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN VIRZI, OF NEW YORK, N. Y.

DESIGN FOR A CABINET.

49,912.

Specification for Design.

Patented Nov. 14, 1916.

Application filed August 1, 1916. Serial No. 112,618. Term of patent 7 years.

To all whom it may concern:

Be it known that I, JOHN VIRZI, a subject of the King of Italy, and a resident of the city of New York, borough of Bronx, county of Bronx, and State of New York, have invented a new, original, and ornamental Design for Cabinets, of which the following is a specification, reference being had to the accompanying drawings, forming part thereof.

The figure is a perspective view of a cabinet showing my new design.

I claim:

The ornamental design for a cabinet as shown.

JOHN VIRZI.

Witnesses:

CHARLES DEUTICE,
JOSEPH CELECETO.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

THE HISTORY OF THE UNITED STATES

The history of the United States is a story of growth and change. It begins with the first settlers who came to the Americas, and continues through the years of exploration, settlement, and the struggle for independence. The story is one of a people who have built a nation of freedom and opportunity, and who have played a leading role in the world.

The early years of the United States were marked by a period of rapid growth and expansion. The country was founded on the principles of liberty and justice for all, and these principles have guided the nation through the years. The story of the United States is a story of a people who have built a nation of freedom and opportunity, and who have played a leading role in the world.

The history of the United States is a story of growth and change. It begins with the first settlers who came to the Americas, and continues through the years of exploration, settlement, and the struggle for independence. The story is one of a people who have built a nation of freedom and opportunity, and who have played a leading role in the world.

DESIGN.

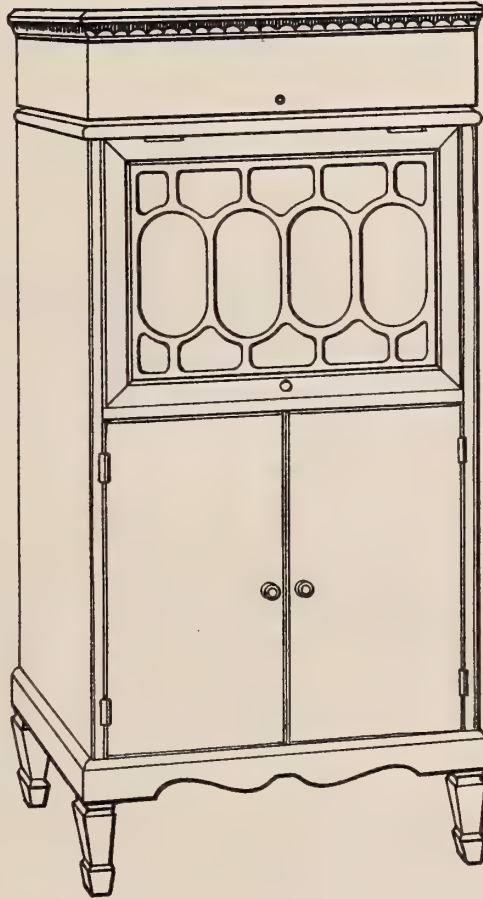
L. MacLACHLAN.

CASING FOR SOUND PRODUCING INSTRUMENTS.

APPLICATION FILED OCT. 30, 1916.

50,072.

Patented Dec. 19, 1916.



Witnesses:

Gause Taggart
H. M. Field

Inventor:

Lachlan Mac Lachlan
By *Cyrus W. Rice*
His Attorney.

UNITED STATES PATENT OFFICE.

LACHLAN MACLACHLAN, OF GRAND RAPIDS, MICHIGAN.

DESIGN FOR A CASING FOR SOUND-PRODUCING INSTRUMENTS.

50,072.

Specification for Design.

Patented Dec. 19, 1916.

Application filed October 30, 1916. Serial No. 128,627. Term of patent $3\frac{1}{2}$ years.

To all whom it may concern:

Be it known that I, LACHLAN MACLACHLAN, a subject of the King of England, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented a new, original, and ornamental Design for Casings for Sound-Producing Instruments, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The figure is a perspective view of a casing for sound producing instruments, showing my new design.

I claim:

The ornamental design for a casing for sound producing instruments, as shown.

LACHLAN MACLACHLAN.

Witnesses:

CYRUS W. RICE,

CLANSON TAGGART.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

THE HISTORY OF THE

REIGN OF

CHARLES THE FIRST

BY

JOHN BURNET

DESIGN.

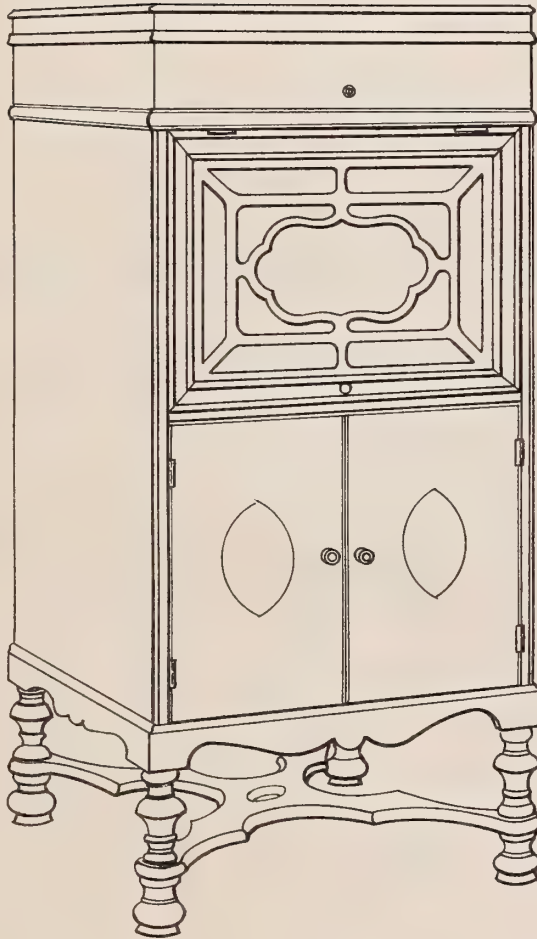
L. MACLACHLAN.

CASING FOR SOUND PRODUCING INSTRUMENTS.

APPLICATION FILED NOV. 1, 1916.

50,073.

Patented Dec. 19, 1916.



Witnesses:

Gaussen Taggart
W. M. Field.

Inventor:

Lachlan MacLachlan

By Cyrus W. Rice
His Attorney



UNITED STATES PATENT OFFICE.

LACHLAN MACLACHLAN, OF GRAND RAPIDS, MICHIGAN.

DESIGN FOR A CASING FOR SOUND-PRODUCING INSTRUMENTS.

50,073.

Specification for Design.

Patented Dec. 19, 1916.

Application filed November 1, 1916. Serial No. 129,023. Term of patent $3\frac{1}{2}$ years.

To all whom it may concern:

Be it known that I, LACHLAN MACLACHLAN, a subject of the King of England, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented a new, original, and ornamental Design for Casings for Sound-Producing Instruments, of which the following is a specification, reference being had to the accompanying drawing, forming part thereof.

The figure is a perspective view of a casing for sound producing instruments, showing my new design.

I claim:

The ornamental design for a casing for sound producing instruments, as shown.

LACHLAN MACLACHLAN.

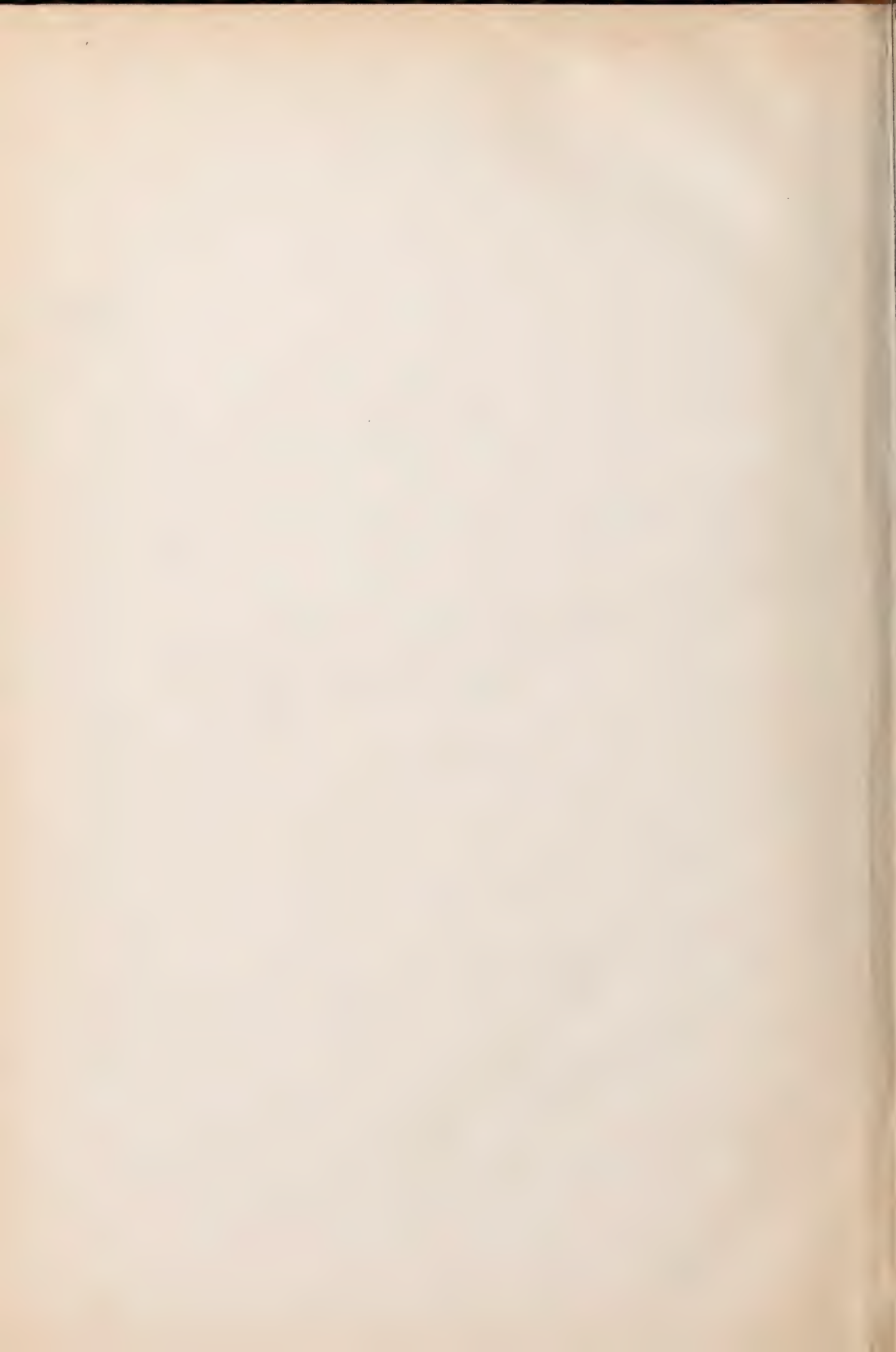
Witnesses:

CYRUS W. RICE,
GANSON TAGGART.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

NOTES BY THE EDITOR

THE EDITOR'S NOTE



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